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# CHEMICAL TRADE JOURNAL.

A WEEKLY NEWSPAPER DEVOTED TO

**The Commercial Aspect of the Chemical and Allied Industries.**

EDITED BY

*GEORGE E. DAVIS,*

FORMERLY ONE OF HER MAJESTY'S INSPECTORS OF ALKALI WORKS.

CHEMICAL ENGINEER AND CONSULTING CHEMIST.

VOLUME II.

[JANUARY TO JUNE, 1888.]

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**SATURDAY, January 7, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

**DAVIS & CO., 42, John Dalton Street, MANCHESTER.**

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The yearly Subscription, commencing at any date, to the *Chemical Trade Journal*,—payable in advance,—including postage to any part of the world, is 10s. 6d. Readers will oblige by making their remittances for subscriptions by Postal or Post Office Order, crossed. The charge for a Postal Order for 10s. 6d. is one penny.

Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

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## PAST, PRESENT, AND FUTURE.

EVER since the establishment of the various branches of chemical industry early in this century the trade has had its "ups and downs," but never before the last decade has depression appeared so chronic and profits so small when trade has been carried on in a legitimate manner. Mr. John Stuart Mill has told us that with advancing civilisation profits from trade become reduced to a minimum, and if our degree of civilisation be measured by the amount of profit made in the ordinary course of free trade in 1887 it may be reckoned to have reached its zenith. If we cast a glance at what has been done in heavy chemicals, say the acid and alkali trade, we shall find that prices have been slowly and regularly falling when the products have been subjected to free and fair competition. Some say the cause is over-production; whether this be so or not, it is quite certain that in many parts of England "the drummers" fight over orders like "Kilkenny cats," and rather than agree to divide what trade there is between them, each wants it all, and continually lowers the price in order to secure the order, until one of them wakes up from his "fool's paradise" and finds he is selling at a loss. This is specially true of the sulphuric acid trade, and is applicable no doubt to other branches of the heavy chemical department.

During the past year Widnes has been exceptionally busy in improvements and alterations. The early part of the year saw the Widnes Alkali Company starting their new chlorate of potash plant; then came the starting of the new revolver, which it is said has reached the workable limit of size to which revolvers may grow; then came the extensions of the manganate and soda plant, and now they are busy with the process of making the waste sludge lime from the causticing process into cement; and in a month or two will also be turning out hydrate of strontium in considerable quantities. This is an instance only of the activity of one works doing their level best in the struggle for existence; but besides all this other firms have been keeping to the front and endeavouring to avert extinction when the old Leblanc process fails them. Messrs. Mathieson have been working long and laboriously at their ammonia-soda process, and so, too, have the Runcorn Soap and Alkali Co.; the Lancashire Sulphur and Alkali Co. have also been unceasing in their efforts to overcome all the difficulties of their new process or processes, while others have been turning their attention to new uses for their oil of vitriol instead of converting it into saltcake. Why all this commotion? Simply because year by year more and more soda is made abroad, and the introduction of the ammonia-soda process added an enormous production to an already well supplied market.

If we turn to other trades we shall find the year almost inexplicable in its complications. To take the tar trade for instance;—benzol was selling this time last year at 1s. 7d. per gallon, a price at which it hardly paid the tar distillers to produce it—by the end of March the price had risen to 2s. 9d., and by June 8th it had acquired the value of 3s. 8d. This caused the carbonising works to commence again and the price receded to about 2s. 6d. The Manchester Carbonising Works and those at Milton have during the year been pulled down and erected again, partially at Talk o'th-Hill, and are now in operation carbonising 1,200 tons of coal per week. Prices of all tar products have risen with the exception of pitch, for which there seems no market.

The year in May ushered our little Journal to the notice of the chemical trades, which to-day is presented to our readers in another garb. It was clearly foreseen that a journal to be of any real use to makers, buyers, and users of chemicals, must be issued at least weekly, and the support which has

been accorded to our efforts has been of a very encouraging nature. We have endeavoured to bring before our readers all the latest processes and discoveries interesting to them, at as early a date as possible, and also to furnish a complete set of market reports for use in guiding the actions of consumers.

With regard to market reports and also respecting new processes, we shall endeavour to provide our readers with accurate information. We have special means of arriving at much that we put before our readers, and having been practically engaged in most of the industries of which we treat, we believe our inferences and opinions are at least as valuable as many put before a confiding public, and on all matters we take in hand we shall speak out fearlessly as we have only one interest to serve, and that is the welfare of the majority of our readers. Anyone believing in the doctrine of the "greatest good for the greatest possible number," will not object to our sometimes boldly saving the multitude from the machinations of a ring of speculators, whose only object is the filling of an already full purse out of the life-blood and sinews of those not strong enough pecuniarily to stand against them. The world is full of such people and their number is increasing every day, and for the simple reason that in our desire to cheapen everything we have reduced trade profits to a minimum, even if there be any profit left at all, so that ordinary legitimate trade is too slow a process for these people whose delight is in "cornering," "bulling," "bearing," and forming syndicates and conventions whenever they can get the weaker element into their clutches. So much for what is going on at present, the manufacturing air is thick with rumours of new processes. Hermite's process of electrolytic bleaching, Pechiney's chlorine process, Chance's sulphur recovery process; the Hargreaves' thermo-motor, Solvay's chlorine process, and those which have been already mentioned. The present is a state of unrest from which every manufacturer is sighing to be free.

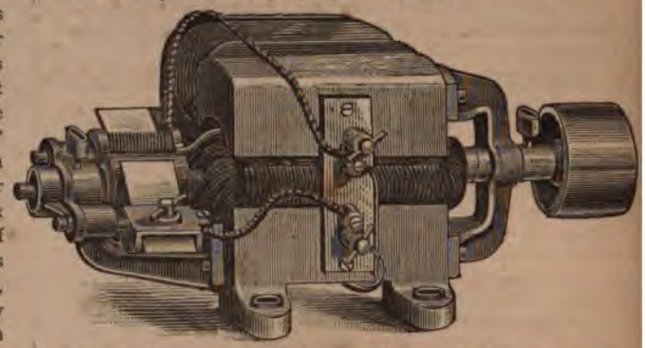
And what does the future promise for us? He would be a bold man who dared to prophesy. The future depends to a great extent upon the successful development of several of the leading processes which have already found experimentalists. Not only Messrs. Chance are busily engaged in endeavouring to recover the sulphur from vat waste, but we believe the process is being tried in another Works also. It is entirely a question of cost, and the sulphur must be sold as such as it is quite evident that sulphur at the present pyrites price would not pay to recover. The recent "boom" in copper, tin, and mercury, causes the users of these metals some anxiety for the future. It has proved a good thing for those who fortunately held large stocks, and it has placed the copper companies also in the position of being able to reduce the sulphur value of pyrites and so compete with any sulphur recovery process. The future is hard to decipher. May it not be that all this unrest has been brought about by the rough and ready methods of the past—by the great waste which has up to now taken place—and by the excessive profits of former days, which led to a multiplication of works, and now that caution and economy have to be practised it is endeavoured to make everything complete in a few years, when it should in the natural order of things have taken a generation.

## DYNAMOS AND ELECTRO-MOTORS.

SINCE the appearance of our article on "Bleaching by Electricity" (see vol. 1, page 99) we have received many inquiries from our readers asking the question where small and really useful experimental dynamos may be obtained, not only for the purposes of electrolysis of chemical solutions, but also for the production of the electric light on the small scale. The dyer, the calico-printer, and paper-maker has often before him the task of judging minute differences in colour shades, and if the day is at all dull it is next to impossible to do so accurately, and to attempt to judge by the light afforded by ordinary coal-gas is out of the question altogether.

Having power at hand, the possession of a small arc light is a problem of the simplest character, and satisfactory results may be obtained with the minimum expense. Incandescent lamps will not answer satisfactorily for colour judging, and though it has been stated that glow-lamps may be used, yet those who have employed them for this purpose give anything but a good account of them. Several calico-printers in the neighbourhood of Manchester have already adopted arc lights in some portions of their establishments, and we have seen the same working in a most satisfactory manner in more than one works; still, most mills are fitted throughout with gas, and it requires very strong pressure to induce a manufacturer to change from a system he has had in operation so long.

It is not, however, the general lighting of the establishment we have now to consider, but the supply of one arc light in a single room simply for colour judging. Messrs. Cuttriss and Co., of Leeds, make some very cheap and good dynamos, which they designate by the term "Eclipse," one of which is shown by the accompanying illustration :—



The "Eclipse" dynamo E 3, which we recommend, will supply one arc lamp; it weighs but 87lb., and takes about 1½ horse-power to drive it, so that when driven from an existing shaft the power taken off would scarcely be appreciable in an ordinary mill. The potential of this dynamo is about 40 volts when yielding a current of 14 amperes, so that if required it could be made to supply ten 20 candle-power glow lamps. The price of this dynamo, as illustrated, is £13, and with one arc lamp, a switch and 20 yards of main cable, £20. We feel sure that this exceedingly cheap installation needs only to be brought before the notice of many manufacturers, who would be tempted to use it in places where ordinary lights are not admissible. The price of the E 3 dynamo with ten 20 candle lamps, switch, 20 yards of main cable, and 40 yards of flexible cord, is but £18.

So much for practical use for works lighting. It may be interesting to know that the same dynamo may also be employed for depositing metals or for electrolysis. It is well known that for plating purposes currents of large quantity, but small potential, are generally used. Perhaps this is absolutely necessary in order to ensure a merchantable character in the deposit, but for depositing metals other than in plating operations, currents of high potential are much more economically generated than those of only two or three volts, and the modern tendency is to use these currents of high potential in a series of electrolysing tanks rather than a larger current of low potential in one tank, between one single pair of electrodes.

Whether a current of high potential used in series, say in the Hermite process of preparing a bleaching fluid by electrolysis, is better than a current of several volts only, can scarcely be settled except by experiment.

For laboratory purposes this firm also supplies a "Student's dynamo," with a "shunt and series" switch, so that a current of low potential and large amount, or *vice versa*, may be obtained at will. This dynamo requires about one-sixth of a horse-power to work it. It is shown in the following illustration :—

It gives a current of five amperes and 13 volts intensity, or, in other words, would light four 7½ candle lamps. Its

cost is £4. 10s., or £4 without the handwheel, ready for driving from a small gas engine or other motor.

In the laboratory there is often the want of a small motor for keeping substances undergoing chemical change in motion, either by agitation, pumping, or other methods—an electro motor is easily adapted to this, the size known as C1 being ample for all purposes of an ordinary chemical laboratory. It is shown by the annexed figure, which indicates sufficiently clearly that it may be screwed down to a base-board or table or suspended by the hook :—

Messrs. Cuttriss's six-cell low resistance battery is quite sufficient for working this motor, which is powerful enough to drive a domestic sewing machine. The cost of the motor is but thirty shillings, and therefore is not a ruinous outlay for any laboratory.

We wish it to be distinctly understood that we only have recommended these dynamos for the distinct purposes herein described, and for lamps made specially to suit the currents produced by them. The larger the dynamo, *cæteris paribus*, the greater the economy, and therefore the student must not expect to work a small machine as economically as a large one. An arc lamp of average illuminating power requires a current of ten amperes and a potential of 45 volts; while a 20 candle-power Swan lamp requires a current of less than one ampere, but of a potential not less than 100 volts. There are, however, lamps in the market that require a much lower potential, and these are used in this connection.

For purposes of electrolysis only a few volts E. M. F. is required, say three or four, and the E 3 Eclipse dynamo may be used for this purpose by sending the current through ten cells of the solution to be electrolysed, each containing a pair of electrodes. At the present time the whole subject is so interesting to bleachers, dyers and calico printers, and paper makers, that we hope its introduction into these pages will prove of general interest also.

## THE ESTIMATION OF PHOSPHORUS IN PIG IRON.

WEIGH off one gramme of the iron turnings and dissolve in 12 c.c. of nitric acid of 1·2 sp. gr. Evaporate to dryness on the water bath, add sufficient hydrochloric acid to redissolve, evaporate to about 2 c.c., then add 2 c.c. of of nitric acid sp. gr. 1·2, filter after adding 3 or 4 c.c. of water, evaporate to less than 20 c.c., add 20 c.c. of the nitromolybdate solution, let stand for two hours and filter off the phosphomolybdate precipitate, washing well with a one per cent. nitric acid solution from a fine jet wash-bottle.

Wash off the phosphomolybdate precipitate into a tared platinum dish with the dilute nitric acid, dry on the water bath, and finally in the water oven, and weigh when cooled in the desiccator. The nitromolybdate solution is made by dissolving 20 grammes of molybdic acid in 80 grammes of liquor ammonia of 0·95 sp. gr. and pouring this into 300 c.c. of nitric acid of 1·2 sp. gr. This nitromolybdic solution should be kept at a temperature of 30° C. for some hours in order to make sure that no precipitation occurs. If any deposit takes place, the clear fluid must be carefully decanted from the sediment.

The yellow precipitate of phosphomolybdic acid contains 1·63 per cent. of phosphorus, so that if the weight obtained be multiplied by 1·63 the result will be the percentage of phosphorus contained in the pig iron.

In a case in point one gramme of No. 4 Bessemer pig turnings gave 0·12 grm. of the phosphomolybdic precipitate, therefore

$$1{\cdot}63 \times 0{\cdot}12 = 0{\cdot}1956,$$

or the iron contained 0·19 per cent. of phosphorus.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND CO.

*** We have not concluded the expert evidence in the above case, but as several correspondents have expressed a desire for a full report of the Judgment—a very imperfect summary of which appeared in the daily newspapers—we give below a verbatim report of the Judgment of Mr. Justice Kekewich, and will continue the expert evidence in a future number.

THE JUDGMENT.

Mr. Justice KEKEWICH: This case has had a curious history. It was launched as an action under Section 32 of the Patent Act, 1883, to restrain the continuance of threats made by the defendants of legal proceedings. These threats were in respect of the alleged manufacture and sale by the plaintiffs of the defendants' patent invention. The statement of claim, as originally framed challenged the validity of the defendants' Letters Patent. This was struck out by Mr. Justice Chitty, but, at the last moment, when the action was ready for trial, was restored by the Court of Appeal on certain terms stated in their order of 5th August, 1887, which included the concession to the defendants of the right to begin and reply on the question of the validity of the patent. When the action came on for trial it was found inconvenient thus to limit the defendants' right, and they were accordingly allowed to open and reply on the whole case.

The result was that except as regards the question whether the alleged threats fell within the meaning of the 32nd Section, and as regards another point under that Section which I will presently notice, the trial was conducted as that of an action by the defendants to restrain infringement of their Letters Patent by the plaintiffs.

At the conclusion of the arguments on that point, I determined the question respecting the alleged threats, holding that the defendants had threatened the plaintiffs within the meaning of the 32nd Section, and that the action was, therefore, well founded in that respect. The statement of claim not only asks an injunction to restrain continuance of the threats, but also pursuant to the same Section damages in consequence thereof. No special damage has been proved, and the circumstances under which the threats were made are such as to preclude the notion that serious damage was sustained. The plaintiffs are entitled to a verdict, but it would be idle, if not otherwise wrong to direct a reference, and I shall best discharge my duty by doing what I may fairly suppose a jury would under like circumstances. Assuming for the moment that there is nothing more in the case, I shall award the plaintiffs 40s. damages.

The other point arising under the 32nd Section is this :—Mr Aston, for the defendants, says—"Even if I made threats they were threats relating to alleged manufacture and sale, which were, in fact, an infringement of my legal rights; and

fore the threats cannot be the subject of an action, and his reason. These Letters Patent of mine confer legal ts, and I have nothing to do but produce them in order vail myself of the condition expressed in the 32nd tion, that no such action as is thereby permitted shall be intainable if legal rights have been in fact infringed." If s were sound the reason for allowing the amendment, ich was based on the decision in Challender *v.* Royle would l to the ground. I understand the Court of Appeal to have cided in the latter case, inasmuch as the action to be rought under Section 32 depends on the question whether he threatening party has or has not legal rights—therefore he question whether he has or has not legal rights—that is, he question whether he is or is not the owner of valid Letters Patent must necessarily be allowed to be raised in such an action.

Apart from this the phrase "legal rights" cannot mean rights under an instrument which is legal only so long as it stands unchallenged. We have in our law the peculiar property styled "legal estate," which is often valuable notwithstanding the possessor has not the whole beneficial interest, and may be valuable notwithstanding that he has nothing else; but subject to this strange exception, I think that the word "legal" in connection with rights, or any like term, must mean what is enforceable in a court of law (including of course a court of equity), or by process of law. To my mind the phrase would not be made different from what it is for the present purpose by the prefix of the adjective "valid." The defendants, therefore, cannot protect themselves by the mere production of their Letters Patent. They are bound to support them as if plaintiffs in an action for infringement, and that they have proceeded to do.

Thus regarded, the action differs only in form from any of the numerous actions brought by patentees against any alleged infringers. There is but one main issue, that of the validity of the Letters Patent; but out of that spring several subordinate issues, raising questions of fact and law of considerable importance and difficulty and also of some novelty.

It is objected on behalf of the plaintiffs, that the defendants, or rather those to whom the patent was granted, are not the first and true inventors. It is not suggested that the defendants do not claim properly through the original patentees, but it is said that these latter gentlemen were not entitled to the patent, and this on two grounds entirely different from one another, and depending on entirely different considerations. It is said first, that Mr. Kynaston, whose method the plaintiffs use, was the real discoverer, and that by reason of his discovery the defendants could not properly be the patentees, and, in the alternative, that Peter Spence and Alexander Esilmann were, or that one of them was, the first and true inventor, and that therefore the Letters Patent were improperly granted to Peter Spence and Francis Mudie Spence.

Before considering the question whether Kynaston was the first and true inventor, I must notice a point taken by the defendants directly relative to that objection, which they say is, under the peculiar circumstances of this case not open to the plaintiffs. These are the short facts. Kynaston applied for the patent, and lodged his provisional specification on 10th August. Messrs. Spence did the like on 11th August, 1882. Messrs. Spence successfully opposed the sealing of Kynaston's patent to this extent—that their own was dated the 11th August, the day of their application, but this was postponed until the 12th, thus making it posterior in date. Kynaston's patent when granted was in the form set forth in the schedule of the act of 1852, and contains the provision to the effect that it should not authorise him to use or imitate any invention for which like Letters Patent had then already been granted. Messrs. Spence say that these Letters Patent, so dated and containing this provision, are conclusive in their favour, and that the plaintiffs are not at liberty to say otherwise. For this purpose they quote several cases, of which I need only notice two, viz., exparte Bates *v.* Redgate, L.R. 4 ch. 577, and exparte Bailey, L.R. 8, ch. 60. Cases of this class, into which fraud does not enter, depend on a simple principle and are easily explained. A comes first for a provisional protection for an invention which he alleges himself to have discovered; B. comes afterwards with a like application for an invention, which may or may not be precisely the same. B then comes before A with his complete specification and seeks a grant of Letters Patent, which is made to him, when A in due course follows with his application for Letters Patent.

assuming the two inventions to be

birthright belonging
all been granted to B, and not ev
family can recall them or grant them wholly
A. The only thing to be done is to make A a grant as
extensive as possible consistent with this principle,—that is
to grant him Letters Patent not covering B's invention, but
good for all other purposes and as against the rest of the
world. This is what I understand two Lord Chancellors to
have done in the cases cited, and they have been followed by
others. They did not determine to what extent the two
inventions were identical, but they directed the second patent
to be granted in such form that it would not protect in his
favour any part of the invention covered by the first. I do
not understand the cases really to go beyond this. I have
not referred to *re* Dering before Lord Cairns, because,
though he is said to have questioned exparte Bates *v.*
Redgate, he really distinguished that case from the one
before him, which the peculiar circumstances of the latter
enabled him to do.

If there at any time came before the court two grants of
Letters Patent for inventions more or less covering the same
ground, the court must apply the principle above mentioned,
whether the relative positions of the patentee have already
been considered by the law-officer (or patent office) or not.
It would be idle to say that the court must regard only the
dates of grant. If, for instance, from some oversight or
error the principle had not been properly applied by those
before whom the application for Letters Patent had come,
the court would nevertheless apply it when litigation ensued.
The court would say that it was *ultra vires* the Crown to
derogate from its own grant, and would construe the second
Letters Patent as extending only to that part of the invention,
if any, which was not covered by the first. If it would be
right to do this in favour of the patentee whose grant is first
in date, though he may have been second in applying for
provisional protection, why should not the second patentee
who applied first for provisional protection be at liberty to
say: Admitting, as I am bound to admit, that you have got
a grant, you can only uphold the grant according to the
established law, and if I prove you not to have been, in fact,
the first and true inventor your grant fails. And if he is at
liberty to urge that the patentee attacking him was not the
first and true inventor, because anticipated by some stranger,
why should he not equally be at liberty to say that he himself was the anticipator. The point is admitted to be novel,
but on principle, I hold that a patentee coming first into
court to attack infringers must be prepared to prove that he
is the first and true inventor as against all comers, including
even a man whose Letters Patent are subsequent in date to
his, and therefore do not give him the right to raise, and may
be said expressly to preclude him from raising, the objection
in that character. These, in my opinion, are the terms on
which the monopoliser obtains a grant of monopoly, and he
must submit to them as part of his bargain.

The proceedings before the law officer in this case were
called to my attention as really concluding the point of
priority. I, however, held that although no doubt the
Attorney-General occupied a judicial position in hearing and
deciding these applications, I could not regard his decision
as binding on me, and that if it was not binding I ought not
to look into the proceedings before him at all. I remain of
that opinion.

This being so, there arises the question or fact whether
Messrs. Spence on the one hand, or Mr. Kynaston on the
other, were the first and true inventors of the particular
method for which Letters Patent have been granted, and
although there are important distinctions between their
respective specifications, their methods may be taken for this
purpose to be identical. Messrs. Spence made their appli
cation—that is, lodged their provisional specification—o
the 11th August, 1682; Mr. Kynaston lodged his on the pr
ceding day, the 10th August. If before the latter da
Messrs. Spence had made the discovery, it is not suggest
that their rights of priority are defeated by the fact that M
Kynaston applied on that day on the basis of the like d
covery. If, however, Messrs. Spence made their discov
after the 10th, then comes the question whether they
ousted by Kynaston's earlier provisional specification. I
first is a question of fact, and a most delicate one. I
before me first, Mr. Esilmann and his book so kept as
with the assistance of the oral evidence to present a p
in the matter of dates. He was a trustworthy witness
gave his evidence carefully and with intelligence.
positive that he made the experiments entered in the

and made the entries before the 10th August, but his memory failed him as regards the delivery of the parcels of Weldon mud, and even if he did not fall into error he was at least wanting in precision on this point.

Next, I have Mr. Francis Mudie Spence, also a truthful witness, but with inaccurate memory respecting the details in question and anxious—I do not say over anxious—not to pledge himself to that about which he was not certain. Then comes John Lucas, the traveller. I give him credit also for being perfectly truthful, but he was too positive in upholding his own story to make it safe to rely on him in all matters of detail. The events occurred more than five years ago, and although he gave a plausible reason for remembering the details, and another was disclosed by the diary kept by him for his employers, yet it must be borne in mind that the details were at the time of little moment to him. John Gilchrist, the manager of the defendants' works, was useful in supplying some facts falling within his own knowledge, and assisting me to put together the pieces of the puzzle, and Mr. Kynaston's evidence must not be forgotten, though it is of less importance. All this evidence has to be considered with the aid of the Lucas diary and the delivery note of the London and North-Western Railway Company. The latter, confirmed by the information supplied from the books of the Company, makes it clear that the important parcel of Weldon mud, alleged by Mr. Esilmann to be the only one, was not delivered till late in the afternoon of the 10th August.

If the matter had stopped here I hardly know at what conclusion I would have arrived. Not only are there inconsistencies which it is extremely difficult to reconcile, but it is equally difficult to make the inferences required to supply missing links. Fortunately there is a private letter written by Mr. Francis Mudie Spence to his father and then partner, Mr. Peter Spence, now dead, which, if it does not remove all obstacles in my path, at least enables me to reach the goal with tolerable ease and certainty.

I wish to explain how and for what purpose this letter is admissible. I have seen like letters tendered in evidence and objected to under similar circumstances, and though to my mind the rules affecting them are clear enough, I am aware of no authority which lays them down. The letter is not admissible as a statement that either the writer, or anyone else named therein did or did not do a particular thing, still less that something which was done had such and such results. To use it for this purpose would be against all principle. But it is evidence that on a certain day the writer gave such and such information to the person addressed, and I may properly refer to his letter in order to ascertain whether his statements, made in the witness-box from memory, are thereby confirmed or varied. I do not think it can be used for any more extended purpose. The particular letter in question is the more valuable because its existence was unknown until a late stage (I am not sure exactly at what stage) of the case. In this letter, written on the 8th August by Mr. Francis Mudie Spence to his father, who was away and ill, there is a distinct statement respecting Mr. Esilmann's experiments, according to the information given to us in the witness-box by Mr. Francis Mudie Spence, who had himself obtained it from Esilmann. Esilmann could not have told, and had not told him at the time that he had worked out his experiments in a practical manner with Weldon mud, but he had told him that oxide of manganese would do the work required, and this is what the letter says.

It is to be inferred from the evidence, though it is not directly proved, that such further experiments as Esilmann had been able to make in the meantime were communicated to Mr. Francis Mudie Spence, and through him to Mr. Peter Spence before he called on the patent agent on the 9th August, or saw him on the 10th. Without giving weight to any such inference, the right conclusion from the facts is that when they applied for provisional protection Messrs. Spence knew that the problem was solved, and that the means of getting rid of iron from sulphate of alumina were discovered, though the precise form more likely or sure to do the work had not been determined and other details remained to be worked out. This, be it observed, is consistent with the language of their provisional specification, which is in many respects wanting in the precision which in such a case might reasonably be expected.

I hold, therefore, that Messrs. Spence discovered the secret before Mr. Kynaston filed his provisional specification, and must be held as against him to be the first and true inventors thereof. This makes it unnnecessary further to consider the alternative question of law above-mentioned as affecting the relative rights of Messrs. Spence and Mr. Kynaston. I might have thought it right to form and express an opinion on it had not the Act of 1883 made it extremely unlikely that such a question will ever occur again. As it is, I pass it by without further remark.

The next question is a mixed one of law and fact, and was suggested by Mr. Esilmann's evidence. He was the analyst or experimentalist of Messrs. Spence, the firm consisting at the time of Peter Spence, the father, and Francis Mudie Spence, the son. Mr. Peter Spence was a scientific chemist, capable of instructing and aiding Mr. Esilmann, and appreciating his labours and their results. Mr. Francis Mudie Spence was not a chemist of the same character, and apparently devoted himself to what I may call the commercial business of the firm. Yet I must hold on the evidence of Mr. Esilmann, and Mr. Francis Mudie Spence himself, that the latter was sufficiently a chemist to make inquiries regarding experiments being conducted in the laboratory, to understand the answers given to those inquiries, and to form the medium of communication between Mr. Esilmann and Mr. Peter Spence. Mr. Esilmann was a chemist and nothing else; that is, he took no part in the commercial business of the firm, but devoted himself to the work in his laboratory. The idea of experiments with manganese seems to have first occurred to him, and although he acted under the instructions of Mr. Peter Spence, and with his assistance, and had communications from time to time with Mr. Francis Mudie Spence, I have no doubt that many stages in the discovery were due to Mr. Esilman alone. To adopt the language of another science, he may be styled the *inventor inveniens*, and likewise the *inventor sine quâ non*. For all purposes, except that of being the first and true inventor, he was the agent of his employers. His labours were theirs; he worked in their laboratory and with their materials, as well as with their assistance, and the benefits of his discovery, morally and legally, belonged to them.

Am I bound to hold that the agency stopped short of making his employers really the first and true inventors of this process, which he, in conjunction with them and for their benefit, discovered? I know of no authority compelling me to do this, and in the absence of authority, principle is in favour of a different conclusion. Messrs. Peter Spence and Francis Mudie Spence declare in the usual form that they were the first and true inventors. I have no doubt that they did so honestly, and, in my judgment, they were right.

I may pass lightly over the questions whether the claim in Messrs. Spence's complete specification is sufficiently definite, and whether there is an excess over the provisional specification. The latter is somewhat crude and exhibits signs of undeveloped invention. Mr. Moulton's criticisms of it in this regard were by no means without foundation, but I think that the grand fact of their discovery is plainly, if roughly, stated, and that all the details contained in the complete specification are such as if not known on the 11th August, 1882, might properly be stated, and indeed ought to be stated by a patentee, who, after obtaining provisional protection naturally devotes time, thought, and labour to the development of his invention. As regards the claim it is undoubtedly sufficient. It may be too wide, because it claims too much, but about what it claims there is no doubt at all. The witnesses are all agreed on this point.

There is one question more, and it is the most difficult of all. Messrs. Spence have patented an invention for purifying sulphate of alumina from iron by the addition of an oxide of manganese. I have intentionally avoided the use of precise language in describing the process, because in this connection I thought a general description more appropriate, and I have intentionally used the words, "an oxide of manganese," because they are used in the opening of the provisional and complete specifications, and for this purpose only are likely to be better understood, and seem to be more convenient than the more technical terms, with which one has become familiar during the process of the case. The provisional specification does not profess to state, and I don't know that it can be said even to indicate, the precise oxide of manganese which can be used most easily or with the most advantageous results.

It certainly does not state that any particular oxide ought not to be used, or will produce no practical results. Turning to the complete specification, I find the same vagueness in the opening words; but when the patentee proceeds to explain how his invention is to be performed he becomes sufficiently definite. Reading the passage in the last two words in line 14, and terminating with the word "solution" at the end of line 16, in a parenthesis, which is

the true construction, it is clear that the patentee proposes to use peroxide of manganese only, and that such peroxide is to be in the well known form of Weldon mud, which, as the manufacturer has it not in stock, and cannot conveniently purchase it in the market, he has to form artificially. That he would have no difficulty in doing this by means well known in 1882 no one for a moment doubts. I need not here dwell on the directions respecting the quantities to be employed, or those for fully oxidising and and stirring, nor need I say more about the passage lines 35—37, than it again distinctly points out the use of Weldon mud. The patentee therefore says distinctly that he uses peroxide of manganese of this character. Weldon mud is hydrated, and the patentee tells the public that he uses the hydrated form. Some of the witnesses told me that their first notion on reading the specification would be to use the native ore, which is anhydrous, but I cannot give them credit for having studied the grammar of the specification, and I do not think that they would have the courage now to repeat the answer. In lines 42—44, the patentees are naturally and properly careful to caution the public not to treat the invention as limited to the precise quantities, nor to the precise modes specified, nor to the use of Weldon mud, but they give there no further information respecting other forms of peroxide, or respecting any other oxides, which may be usefully employed, and one would infer that they intend to claim peroxide of manganese in the form of or approaching to the form of Weldon mud.

The claim is wider than this. It is of "the use of manganese combined with oxygen as peroxide for the purpose of purifying solutions of sulphate or other salts of alumina." Between the words "peroxide" and "for the purpose" there are nearly two lines of letterpress which might perhaps have been omitted without seriously affecting the sense, but which have given rise to much evidence and argument.

It is proved that manganic acid has not yet been known in an isolated form, and there was founded on that some argument to which I do not propose to refer There was some further evidence about permanganic acid which need not be noticed. All the witnesses agreed, or, if I have misunderstood some of them, at least the the majority of them are agreed, and I am sure their conclusion is right, that the parenthetical words are exhaustive of every form of peroxide of manganese; that is, that no known form can be described in language which would not be comprehended in this parethesis, and the patentees' claim may therefore be read as of the use of manganese combined with oxygen or peroxide, however produced, for the purpose of purifying, etc. This includes all the various forms of hydrated peroxide, and all the various forms of anhydrous peroxide wherever found and however brought into existence. Even chemists are compelled, as their fellows in other exact sciences are compelled, to ignore infinitessimals, meaning thereby such minute quantities as cannot by any known means of calculation vary the practical result, and when the witnesses speak of anhydrous peroxide of manganese, whether found in the native ore or artificially produced, they must be understood to mean a thing not absolutely anhydrous, but for all practical purposes free from water of hydration. I shall use it in this sense.

Before referring as I must do briefly to the evidence respecting the different operations of the hydrated and anhydrous forms of peroxide, let me pause to consider the law by the light of which that evidence must be regarded and applied. The Badische case is not the only authority on the subject; but seeing how directly the point which I have to consider was considered in the House of Lords, and that the grounds on which the House decided in reversing the Court of Appeal are carefully explained in the speeches of the Lord Chancellor and Lord Herschell, I think it would be idle for the present purpose to go back to other authorities or to do otherwise than rely on this recent exposition of the law. The Lord Chancellor and Lord Herschell both laid down in plain terms (see pages 462 and 466 of Patent Reports, vol. 4, No. 18) that the element of commercial pecuniary success has no relation to the question of utility in patent law generally, and that it is not a correct test of utility to inquire whether the invented product was at the time of the patent likely to be in commercial demand or capable of being produced at a cost which would make it a profitable speculation to manufacture it. They further laid down (I am paraphrasing their language) that a patentee is not bound to state which of several methods, all capable of producing his invention, will produce it most cheaply or otherwise to the greatest advantage.

But the Lord Chancellor, on page 462, so speaks of a laboratory experiment as proving the possibility of a product, but not really practically producing one in such quantities and under such circumstances as really to make it a product at all, that he may fairly be inferred to mean that a production of that kind could not be properly patented; and Lord Herschell, on page 466, in a passage exhibiting his strong desire to support a patent containing several methods, one of which at least is proved to be of great commercial value, adds: "And it is not shown that any of them are incapable of being used effectually," from which I infer that if that were proved, his conclusions would be different. Again, on page 467, in noticing an objection that the specification employed language calculated to warn anyone studying it against adopting the particular means by which one special dye could be attained, he says that this would be a serious matter if it were established, and I think he would have made the same remark about the converse objection, if it had there occurred that the specification employed language calculated to lead anyone studying it to adopt means which would not produce the desired result. Lord Macnaghten did not address the House, but it is well known that where judgment is reserved in the House of Lords, the speeches of the noble and learned lords who take part in the case are written and circulated, and I must regard Lord Macnaghten as having concurred not merely in the conclusion at which the Lord Chancellor and Lord Herschell had arrived, but in the statements of law on which those conclusions were based. Indeed, he expressly says so on page 470. I have, therefore the deliberate declaration of the highest Court of Appeal, and of each member of it, that although a patentee is not bound to prove his invention to be commercially useful, and not bound to explain which of several methods, all more or less possible, is the best or the least advantageous, yet all his methods must be more or less possible, and he is bound to state what methods are possible and to avoid stating as possible the methods, if any, which are not.

I will now state the result of the evidence on this part of the case, and endeavour to apply the law to it. I need not state the evidence or any part of it in detail, because there is really no conflict between the several scientific gentlemen who were examined before me. They all agreed that for the purpose of obtaining a good result an hydrated form is required, and that of the hydrated forms Weldon mud is at least as good as any other, if not the best. They further agree that the anhydrous forms produce no result unless the peroxide is used in such large quantities as to make the process useless from a manufacturing point of view. I will return to this presently. And further, if they do not all agree, it is the clear result of their evidence that the excellence of result varies in direct proportion to the increase of hydration, as between the anhydrous on the one hand and Weldon mud, which I take to be the best of the hydrated forms, on the other. This, therefore, is reasonably clear, that Messrs. Spence have claimed the use of peroxide of manganese, whether hydrated or anhydrous, and that the anhydrous oxide is, for commercial purposes, useless. But, says Mr. Aston, the commercial value is, according to the Badische case, not a proper test of utility, and all the experiments of Professor Dewar and others, which he says have proceeded on the wrong principle, namely, that of endeavouring to ascertain what cannot be done instead of what can be done according to Messrs. Spence's specification, prove that the anhydrous peroxide does produce a result, and therefore these experiments cannot be cited to show that the anhydrous form is incapable of acting. To this the first answer is, that although, that in order to produce any result at all anhydrous peroxide must be employed in such large quantities that the process cannot be used in commerce, may not be a legal objection to the patent, yet the statement that when so employed it produces a result is deceptive, because with such large quantities it is impossible to say that some impurity has not crept in, and the result may possibly and according to chemical laws may likely be the agent which enables the production.

The evidence certainly supports that view. Another answer intimately connected with the first is that these are merely laboratory experiments, that it is impossible to produce any result otherwise than by means of a laboratory experiment understood as the Lord Chancellor explained it, and that really and practically there is no product at all. Either answer, if sound, would be sufficient. Holding both to be sound I must further hold that Messrs. Spence having claimed to purify sulphate of alumina by peroxide of manganese, whether in the hydrated or anhydrous form, and

the latter form being impracticable, they have not given that information to the public which the public have a right to demand at the hands of a patentee, or rather that they have informed the public that the result can be obtained by either of two processes when one, only one of them will produce it, and that therefore not having fulfilled their part of the bargain their patent fails.

I have endeavoured to state my conclusions of law and also my deductions from the evidence with the least possible use of technical terms, because I have thought it best so to do. I have even avoided the formula Mn. $O_3$ and many other standard formulæ and chemical terms. I hope, however, that those who prefer to read technical language will find no difficulty in translating my judgment into it.

Although this action has been in substance one by Messrs. Spence against the plaintiffs for an infringement of Messrs. Spence's letters patent, yet it is only so in substance and not in form. It is not an action for infringement within the meaning of the Patent Act, 1883. I am not therefore, in a position to give any certificate.

There will be judgment for the plaintiffs for an injunction restraining continuance of the threats of which they complain, and awarding payment of forty shillings damages, and the defendants must pay the costs of the action to be taxed on the higher scale.

Mr. Aston: My lord, do not we get the costs as to infringement?

Mr. Moulton: They have no legal rights.

Mr. Justice Kekewich: I do not quite understand you, Mr. Aston.

Mr. Aston: On the question as to whether there was not an infringement, in fact.

Mr. Justice Kekewich: That only arose on the threats.

Mr Aston: Yes, my lord, but there were expenses in connection with it.

Mr. Justice Kekewich: I dare say. That arose on the threats which I decided against you. I took that into consideration in connection with the threats. It is only a small, subordinate part of that question which I decided against you.

Mr. Aston: Then the point as to the sufficiency of our specification is in our favour.

Mr. Justice Kekewich: I think you have failed. I have no doubt you will have an opportunity of re-opening this question. I think you failed on that ground, which, as it was by far the most difficult, I reserved to the last. I think you were bound to come here with good letters patent, and as you have not, I think you must pay the costs,

Mr. Moulton: The costs will be on the higher scale, I presume.

Mr. Justice Kekewich: Yes, I said so. There will be no difficulty about drawing up the order.

## A STARTLING COMPARISON.

IN an article upon another page dealing with the new Hargreaves thermo-motor we have stated that two gallons of gas-tar consumed per hour generated power equal to 35 horse indicated, but the diagrams which have since been taken show most clearly that the net result is more nearly 40 indicated horse-power, and that the maximum result has not been reached yet. We will take it for our purpose that 40 horse-power is the normal development, and carry our readers with us in a few calculations to show the importance of a careful study of this subject.

The most general source of illumination in this country is coal-gas, and we may take it without sensible error that 10,000 cubic feet are obtainable from each ton of coal. Without any admixture of cannel, ordinary gas will not when burning from a London Argand burner, yield more light on the average than 18 candles from a consumption of five cubic feet per hour. To be on the safe side, let us call it 20, which is equivalent to four candles per cubic foot. By means of the "Wenham" burner as much as eight candles may be developed from each cubic foot of gas consumed, so that with ordinary burners we have 40,000 candles per ton of coal and with the "Wenham" burners 80,000. Two hundredweights of coal will therefore give 4,000 candles and 8,000 candles respectively, and a hundredth part of a ton one-tenth of these amounts, or 400 candles and 800 candles. Why we have chosen this standard of one-hundreth of a ton will appear presently.

For out-door illumination the "luminator," "lucigen," and other lights have been largely used of late, and with a consumption of two gallons of tar-oils per hour the light is stated to be one of over 3,000 candles intensity. The light afforded by either of these pieces of apparatus is certainly very great, but whether it reaches this large figure or no, we have not any authentic information. Two gallons of light coal-tar will weigh about 22·4lb, or the one-hundreth part of a ton.

The electric light depends mainly upon a cheap supply of power for the development of electrical energy. We have already shown that on the Hargreaves system, that a 40 horse-power engine may be run against its full load at the expense of two gallons of coal-tar per hour, or 22·4lb. as as against 160lb. of coal if burned under boilers in the ordinary way, an efficiency at least seven times as great as in the best form of modern engine consuming 4lb. of coal per indicated horse-power per hour. It may be that some are doing better than this, but we feel sure that the majority of steam users do not come up to it.

Now, in electric glow-light installations it has become an established fact that one cannot safely reckon on more than 150 candles per horse-power per hour, and similarly when the arc-light is used, 1,500 candles per horse-power is the maximum limit, so that by using the Hargreaves thermo-motor wherewith to drive the dynamo, two gallons of tar, the equivalent in weight of one-hundreth of a ton of coal, would produce an illumination by means of glow-lamps of 6,000 candles, or by means of the arc light 60,000 candles.

These figures are sufficiently startling to lead us to believe that we are on the brink of a great revolution in the lighting of large establishments, but the time has not yet nearly arrived when we can look forward to domestic lighting by means of electricity, not because it cannot be done, but on account of the conflicting interests that stand in the way. But this cheap source of power for the production of electricity is likely to cause its extension in other quarters; day by day it is being more extensively employed in metal deposition other than in plating operations, as may be seen by the recent reformation of the Electro-metal, Extracting, Refining, and Plating Company Limited, which is soon to carry on business on a larger scale than ever. For the deposition of copper from its solutions we have it on very good authority that a 40 horse-power engine will deposit nearly three tons of copper per day, and if the dynamo be driven by an engine consuming only two gallons of tar per hour, what on earth can compete against it, save perhaps the mill-stream, which cannot be brought to every man's door?

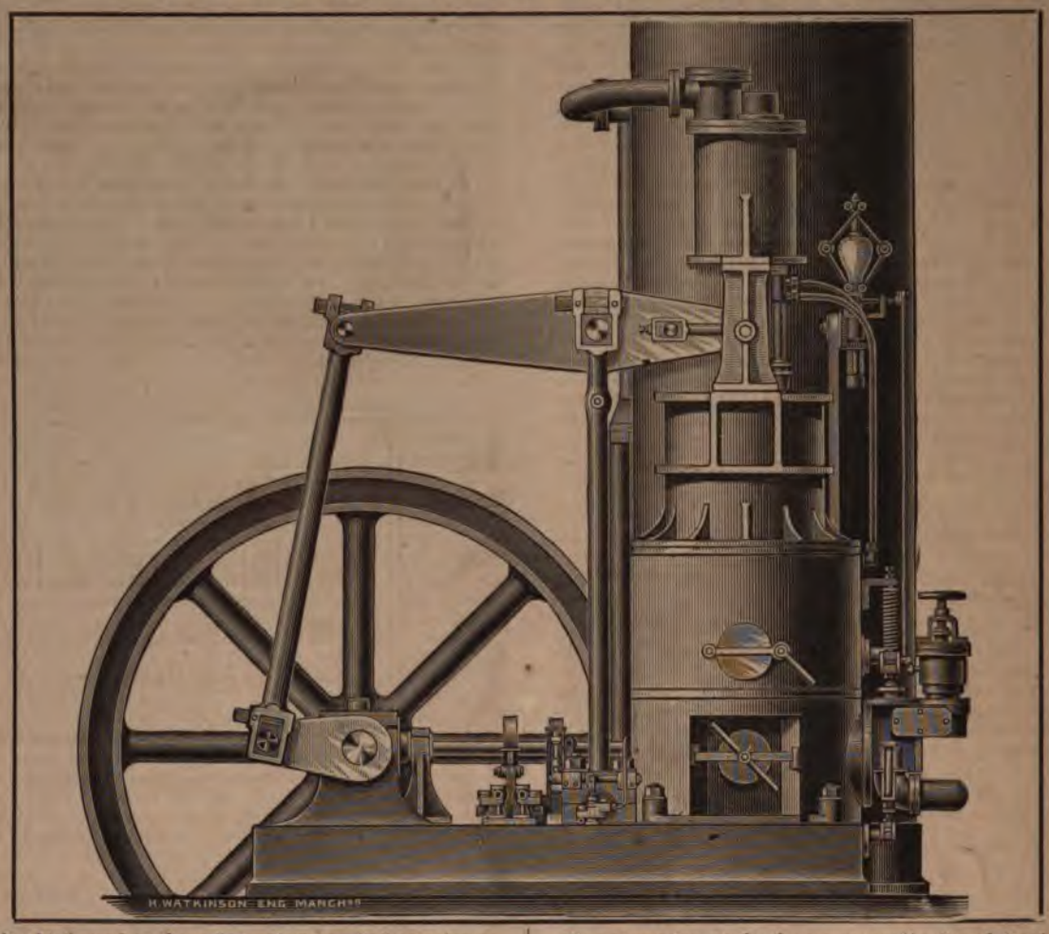
In a previous number we had the opportunity of saying a few words upon the Hermite process of bleaching by electricity, and we stated that the principal objections urged against it were cost of electricity and the secondary decompositions which took place. We see no reason why the secondary reactions cannot be overcome, and being supplied with a cheap source of electrical energy, we see no reason why even a low efficiency should militate against its introduction,

We have introduced the foregoing examples as being amongst the most striking occurring to us at the moment. They form good subjects for comparison, but there remain many instances quite as striking. If once the user of power realises the fact that he can drive a large engine of 40 indicated horse-power and upwards with a consumption of two gallons of gas-tar per hour, costing a penny per gallon, and *pro rata*, without chimney shaft or boiler, without stoker, without water supply, without creating any smoke, in fact *sans* anything save the engine itself, the problem of the amelioration of the atmosphere of our manufacturing centres will stand a good chance of being solved, and the economy of materials employed in the production of motive power will have begun in earnest.

FIRES WITH NEW PROCESSES.—Some time since the new ammonia-soda process of Messrs. Mathieson and Co. was destroyed by fire. We have now to chronicle a serious fire in the new processes of the Lancashire Sulphur and Alkali Co. at Widnes.

THE MANCHESTER CHEMICAL CLUB.—After a few months' sojourn at the Grand Hotel, this club has taken up its quarters at the Victoria Hotel. On Tuesday last there was a fair gathering of members after they had come off 'Change, so that there seems every chance of continued prosperity.

# THE HARGREAVES THERMO-MOTOR.




IN the third number of our first volume we had occasion to refer to the Hargreaves thermo-motor, as a recent device for converting a larger proportion of the heat of combustion of fuel into dynamic energy.

At that time experiments were still in progress, and we felt bound to observe a certain degree of reticence as to some details which had come to our knowledge which Mr. Hargreaves was then elaborating. It is somewhat amusing to observe the absolute ignorance or incredulity of the engineering press with respect to this motor, the so-called "leading" ones never having even so much as mentioned it! and yet it is only a solution of the problem given by Carnot, Thompson, Joule, Rankine, Dalton and others, whom they regularly quote as authorities on thermo-dynamics, and what is more, seems to have been worked out strictly on the lines foreshadowed by these philosophers. Mr. Hargreaves, in fact, disclaims having added a single scientific fact to what was already known, and claims only to have transferred the problem from the laboratory to the machine shop. This, however, has required the most dogged pertinacity and perseverance for nearly six years, which have been exclusively devoted to this work.

Since our former article a new engine has been constructed by Messrs. Adair and Co., of Liverpool, which embodies improvements not contained in the experimental engine at Widnes, The suggestions which we ventured to make in our article as to radiation, heating surfaces, and area of passages have evidently been attended to with most satisfactory results. Mr. Hargreaves has been fortunate in his choice of an engineer to carry out his ideas, for the machine is very creditable to the maker, and a great contrast with the one upon which the previous experiments were conducted. Indeed, when looking at the latter, some of our engineering contemporaries would wonder how any results were ever got out of it at all, for most of them seem to estimate the value of an apparatus, not by the correct application of the physical forces which actuate it so much as by its mechanical "get up" and polished surfaces. To the *Chemical Trade Journal* belongs the credit of first appreciating the value of the methods adopted by Mr. Hargreaves. When making the suggestions referred to, we also ventured to predict that their adoption would be followed by notably increased efficiency, the following facts show that our anticipations were correct. The volumes swept through by the working piston and air piston are precisely the same as in the experimental engine, but whilst the first engine gave only 29·7 horse-power from a consumption of two gallons of coal-tar per hour, the new engine gives at least 35 indicated horse-power from the same consumption of fuel.

The construction of the engine now running in Liverpool may be seen from the accompanying illustration. The cycle of operations is as follows: Air is compressed in an inverted air compressor along with a finely divided spray of water. The heat developed by compression of the air is in great part absorbed in molecular work, by converting some of the water into vapour, and another portion in raising the temperature of the remaining water. The vapour produced of course adds to the volume of the gases, but this is more than compensated for by the contraction due to the cooling produced by the evaporation of water, hence the curve of compression is below the adiabatic but above the isothermal line, being about one-third the distance above the former, and two-thirds below the latter. The temperature due to adiabatic compression up to 60lb. per square inch above the atmosphere with an original temperature of 60° F. would be 380° F. With the method adopted by Mr, Hargreaves the temperature rises only to about 160° F., while the vapour tension of the water diffused through it is 4·7lb. per square inch. It is owing to this reduction of temperature that it is possible to reduce the final exhaust to the low temperature of 180° F.

before finally rejecting it, while at the same time the negative work of the air compressor is considerably reduced.

From the compressor the air carrying finely divided water with it, flows into a vessel called the saturator, traversed by copper tubes through which pass the exhaust gases from the working cylinder. The heat left behind by the exhaust gases is expended, partly in heating the air, and partly in converting the suspended spray into vapour and diffusing it amongst the air according to Dalton's law. From the saturator the air passes to another tubular vessel called the superheater, where the saturated air is dried and superheated, and a quantity of steam added from a source to be afterwards described. Hence, the mixture of air and vapour passes through the inlet valve and through a regenerator. Here it comes first in contact with some corrugated metal plates, and afterwards with spiral earthenware rods, then through a block of fireclay perforated with small holes. By the time the air and vapour has arrived at this point it has attained a red heat, when there is injected a small jet of coal-tar, creosote, or other liquid fuel. Here the volume of the mixture of air and vapour is still further expanded, combustion takes place in air already heated to redness, and hence the temperature would be sufficient to fuse even the most refractory of all the materials used in the construction of the engine; but this temperature is somewhat modified by the presence of water vapour, which absorbs a portion of the heat in elevating its own temperature and increasing its volume. Another portion of the heat is absorbed by a water jacket surrounding the cylinder, and by a quantity of water contained in the hollow piston. The water passed through the air pump is in excess of what can be diffused amongst the air by the heat from the exhaust gases; this excess of water collects at the bottom of the saturator and is taken hold of by a small pump and made to circulate, first, through the piston, and afterwards through the water jacket surrounding the working cylinder. In the piston and jacket the water is converted into steam, which is also added to the air in the superheater and so increases the volume of the working fluid and moderates the intense temperature caused by the combustion of the liquid fuel.

After the piston has performed its outstroke the products of combustion are exhausted through the regenerator, then through the heating tubes of the superheater and saturator. The temperature is continuously decreasing from the working cylinder to the chimney, while the entering air together with the diffused vapour and added steam arrive at continuously hotter and hotter surfaces on their way from the air pump to the working cylinder, and thus attain a bright red heat before arriving at the point of combustion. It is not very practicable to measure the temperature of the contents of the working cylinder by pyrometers, but an approximate estimate may be made from the volumes and pressures of the working fluid at various parts of the stroke. This shows the temperature to be about 2,500° F. while the temperature at the exhaust is less than 180° F., thus showing considerably greater temperature differences than those we had to record about the experimental engine at Widnes.

The thermal problem thus solved was not sufficient to produce a practical engine. It was necessary to keep the rubbing surfaces of the piston packing rings, the valves and their glands and packings at reasonably low temperatures, and free from grit and abrading materials. In the case of the packing rings of the working cylinder, the temperature is actually lower than in the steam engine. The boiler part of the working cylinder is used as a combustion chamber, while the piston is practically a steam boiler hung from the junk ring, while the upper part of the working cylinder is kept apart from the lower portion by a sheet of asbestos. In this upper part, which is open at the top, the junk ring works, and it is also separated from the boiler piston by a sheet of asbestos. The mirror-like surface of the working cylinder is alone a sufficient indication that no gritty materials have acted upon it, and the lubrication is not at all injured by heat. The working valves are placed between the superheater and the regenerator, the inlet valve being exposed to a current of air vapour at 220° F. and the exhaust to a current at 460 F., with a variation above or below of about 20° F., according to the supply of fuel, amount of work on the engine, etc. The highest of these temperatures is not sufficient to do any injury to the exhaust valve, which is one of ordinary mushroom shape; but as a matter of fact this valve never attains the higher temperature, because the inlet gases flow over one surface and return a part of its heat to the regenerator and working cylinder.

As the total consumption of fuel is so small there is little room for waste, for a very small loss would amount to a large proportion of the total heat from the fuel, hence there is no stifling heat from the motor, and such an appliance to a steamship going through the tropics would be a perfect god-send to every one on board.

In our opinion Mr. Hargreaves might have improved the proportions of his working parts by giving the working piston a little longer stroke, with the same volume of air pump and the same quantity of fuel supply. The gases are rejected at a terminal pressure of 12lb. per square inch, with six inches more expansion an addition of fully five horse-power might have been obtained from the same quantity of air and fuel. There are many hot-air engines whose maximum pressure is lower than when the working fluid is rejected in this case.

It is a pity to see so much power wasted when it might have been saved by a little difference in proportions; judging from the indicator cards, too, still a little more freedom in the passages would not be amiss. Perhaps Mr. Hargreaves will take these hints into consideration when designing another engine.

In another article we have pleasure in putting before our readers some of the practical bearings of this thermo-motor, and the results capable of attainment are sufficiently startling to cause an immediate and general inquiry on the part of the steam using public. On the other hand, shale-oil distillers, tar distillers, and coke-oven proprietors may find it in their interest to follow what might be done in the future with this thermo-motor, and gas engineers may with profit turn their attention to it also. To tar distillers at the present time the subject is of more than ordinary interest, as coal-tar pitch dissolved in creosote is the very best fuel which could be employed with this motor, provided it is made fluid enough to flow through pipes.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

D. S. C.—We shall be pleased to receive your letter on "Christmas boxes" for publication.

A. R. C.—Yes. The bleaching of oils and fats comes under the list of subjects we desire.

C. C. C.—Ferrocyanide of sodium is now largely made and used.

H. A. F.—The work is now in full operation.

D. C. J.—We would advise you not to look for the extreme prices; it is a dangerous proceeding.

B. W.—There are many substances which may be reckoned as explosives not coming under the Act.

To Our Subscribers.—Owing to the fire at our printers' the almanac is not sufficiently advanced to issue with this number. It will be issued along with the index to Vol. I. as soon as ready.

**** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—With regard to the correspondence now going on in your columns concerning the Institute of Chemistry, may I be permitted to make a few remarks from another standpoint?

It appears to me that many of the unfortunate Fellows who are now deploring the absorption of their guineas by the Institute have really themselves to blame for the want of attention that they appear to have paid to the signs of the times in forming the unreasonable expectations that are so far from being realised. Your correspondent, "Menenius," for example, appears to think that in return for his subscription the Institute ought to protect him from the competition of those whose names are not followed by the mystical F.I.C. Now, sir, is this possible? I can quite imagine it to be within the limits of possibility that the Institute may eventually—say in five or six hundred years, judging from their present rate of progress—succeed in restricting the right at present enjoyed by everybody to practise publicly as a consulting or analytical chemist; but I cannot conceive it possible in this age of progress and expansion that they will ever be so far able to interfere with the liberty of the subject as to dictate to the manufacturer in his choice of a chemist. The moral to me is a plain though perhaps a selfish one. I think that works' chemists had far better keep their guineas in their pockets, and leave the alluring Fellowship of the Institute, with its ennobling certificate of competency, to

those of their brethren who are enjoying or looking forward to a public practice, and who are possessed of a sufficient complement of confidence and guineas to go on indefinitely casting their bread upon the waters in the hope of seeing it after many days.—I am, etc., COMMON SENSE.

*** We have received several other letters upon this subject, but want of space compels us to hold them over until next week.—ED. *C. T. J.*

## STEAM TRAPS.

*To the Editor of the Chemical Trade Journal.*

Sir,—In your article in last week's journal you make a rather sweeping assertion that most of the existing steam traps in the market are nearly useless. To this statement as a steam trap maker I must demur, as I have seen and fitted many which acted perfectly, and were not "a standing dish for the fitting shop," as you have averred, When you say that there should be no valves or other impedimenta to prevent the condensed water flowing into the trap, you only express the construction of most of our "trap" makers, and it may be interesting to some of your readers to know that steam traps, constructed on similar principles to Klein's, of which you speak so highly, have long been made in this country by several firms. I enclose my card, but prefer to sign myself, A STEAM TRAP.

## A CHEMICAL IMPOSTOR.

*To the Editor of the Chemical Trade Journal.*

Sir,—I desire, through the columns of your widely-circulated journal, to warn chemists against an impostor at present going the rounds. He is of medium height, fair hair, sallow complexion, face somewhat marked, slight moustache, generally seedy appearance, and distinct German accent. Age, 30 to 40.

He claims to be a Ph.D. Tells a most pitiable tale, and winds-up by showing pawnticket of gold watch or overcoat, or offering to sell books; or, again, requires money to go to Edinburgh or Hamburg, or perhaps to his wife and children in Perth or Aberdeen, or some other conveniently far-off place. Some of his aliases are Ross, Benedikt, Braun, or Brauns, etc.

To my knowledge he has fleeced many in Scotland and in the North of England; he visits works and city laboratories, with which he becomes conversant. Small chance has any deserving man who may follow him.—Yours, etc.,

F.I.C., F.C.S.

## THE MANUFACTURE OF SULPHOCYANIDES.

DURING the past few years the sulphocyanides of certain metals have been largely employed in calico printing. As early as 1875, Messrs. Spence Bros., of Manchester, manufactured large quantities of sulphocyanide of ammonium from the residual products of gasworks, and later on when the ammonia became more valuable to them, the sulphocyanide was sold in the form of the calcium salt. The firm of John Nicholson and Sons, of Leeds, afterwards turned their attention to this manufacture, and placed large quantities of the crude article on the market, most of which was absorbed by the Clayton Aniline Co. and by Messrs. Higgin, Lloyd and Co., of Gaythorn. Having to compete with the purer article from the Continent, but little crude salt was at length manufactured, and it is to the present waste in England that is now going on that we desire to call attention.

The gas water produced by all the gas companies of the United Kingdom does not amount to less than one million tons annually. A ton of gas water contains on an average, about 14lb. of sulphocyanide of ammonium, so that the value at 8d. per lb. in the whole of the British ammonical liquor amounts to the respectable figure of £466,666 sterling per annum.

Our readers may say, perhaps, how is it that this loss has not been discovered before? It has been. In the year 1864, Mr. Peter Spence obtained letters patent for "Improvements in the manufacture of sulphocyanide of ammonium and other sulphocyanides," in which the mother liquor was treated with a solution of a mixture of sulphate of copper and protosulphate of iron in about equal quantities. A greyish white precipitate of cuprous sulphocyanide was precipitated which, after washing, was decomposed by the sulphide of the metal of which it was desirous to form the sulphocyanide. The treatment resulted in the formation of sulphide of copper, the basic metal combining with the sulphocyanogen.

Much of the sulphocyanide at present in the market goes to form a solution of the sulphocyanide of aluminium, a compound largely used in connection with artificial alizarine, and for this purpose the sulphocyanide of barium is preferred, as by mixing a solution of it with a solution of sulphate of alumina, an insoluble sulphate of barium is formed, which settles readily from the solution sulphocyanide of aluminium.

The following process for the production of sulphocyanide of barium may not be unworthy of the the attention of those manufacturers of sulphate of ammonia who desire to make something more out of their raw materials. The waste liquor from the sulphate of ammonia stills should be allowed to settle to get rid of suspended lime, the clear solution is then to be acidified with dilute sulphuric acid, and to it a solution of sulphate of copper and sulphate of iron is added in the proportion, 28lb. of the former and 30lb. of the latter to each ton (220 gallons) of the waste liquor. The mixture must be well agitated and allowed to settle, and when sufficient of the magma has accumulated, it may be put through a filter-press and washed to free it from soluble impurities. Sulphide of barium must now be either made or procured. It may be easily produced by roasting the sulphate with small coal, but as it is an article now largely produced it will be found cheaper to purchase it. The insoluble sulphocyanide of copper is now kept agitated in a solution of barium sulphide until the sulphur has gone over to the copper and the sulphocyanogen to the barium. The black insoluble sulphide of copper is allowed to settle out, and the clear solution of sulphocyanide of barium is evaporated and allowed to crystallise. The methods here described may appear complicated, but in practice they are the simplest imaginable, and can be carried out with the most ordinary intelligence. There is only one point to watch—loss of copper. To avoid this, copper sulphate should never be added in excess to the crude liquor, a very simple test with ferrocyanide will avoid this, and it stands to reason also that the copper sulphide must not be wasted.

The copper sulphide is therefore to be collected and roasted in a furnace at a very gentle heat, when copper sulphate is formed mixed, however, with a little oxide. The roasted mass is lixivated with a weak solution of sulphuric acid, and used again and again in the round of precipitation.

This process deserves the attention of all sulphate of ammonia manufacturers, as if the cost of manufacture is carefully kept down, there should be a profit at present prices equal to thirty shillings per ton of sulphate of ammonia.

In the production of a ton of sulphate of ammonia, it should be possible to produce nearly two hundredweights of sulphocyanide of barium. Some liquors are considerably weaker than this, but the figures cited above are the average of all liquors that have come under our notice.

## Our Book Shelf.

A TEXT BOOK OF PAPERMAKING. By C. F. Cross and E. J. Bevan. London: E. and F. N. Spon.

THE authors state in their preface that their "belief in the importance of a thorough scientific training for papermakers has dictated the style and purpose of the book," and if we follow them through the 240 pages which they have so pleasantly written, we shall find that they have treated their subject not only in a masterly manner, but have laid the technical side uppermost in a manner we have not been accustomed to in ordinary technical works. The authors have an advantage perhaps over most technical writers, inasmuch as they have both been practically engaged as chemists in large mills, and therefore have the whole subject at their fingers ends; moreover they have both done good work in investigating the properties of various kinds of cellulose, which may be found incorporated in Chapter I. of their text book.

Chapters II. and III. are extremely interesting to chemists who have to make fibres their special study, and these, together with Chapters IV. and V., might be studied with advantage by every microscopist. In works of this kind it is so common to find woodcuts in the text that have been made to do duty several times over for other works, and possibly having their origin abroad, that it is a great treat to find something original, such as the sections of esparto grass and the microscopic characters of other fibres, which, having never seen before, we imagine have been drawn by the authors and cut specially for this work. Messrs Cross and

Bevan are photomicrographers of no mean order, and a plate of fibres from their manipulation forms the frontispiece to the book.

From Chapters VI. to XI. the various operations of the papermaker are minutely described, boiling, bleaching, beating, sizing, calendering, etc.; while Chapter XII. treats of the recovery of the waste soda-lye, which at one time was run by the papermakers into the nearest stream to poison the fishes and to make the water unfit for use to those below them. The remainder of the book is extremely interesting to those who essay to carry on their business in a scientific manner, and to look after the manufacture from a chemical standpoint.

In connection with the bleaching of pulp, a short account is given of the Hermite process of electric bleaching, which now only awaits a cheap source of electric energy for its final and complete development. The curious fact noted and recorded by the authors is, that the chlorine compounds set free during electrolysis from magnesium chloride is more active than the chlorine from bleaching powder in the proportion of 5 to 3. How this comes about is not explained, but perhaps the authors have this investigation in hand.

In order to bring up the information to the latest date, the American evaporator by multiple effect is described in the addenda. Some of these machines are now in course of erection in England for the evaporation of the waste soda lyes. The Porion evaporator, the Chapman, and Rôeckner evaporators are also described in the body of the work, so that the information is complete in this direction.

As a text book of papermaking we feel sure this work will result in a very large distribution, and we heartily recommend it to our readers, not only papermakers, but to all those who are interested in textile fibres.

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A Systematic Handbook of Volumetric Analysis. Francis Sutton, F.I.C., F.C.S. Fifth edition. London: J. and A. Churchill.

Sutton's Volumetric Analysis is a work sufficiently well known to all chemists engaged in technology. Those who possess the earlier editions will now be pleased to find the treatise brought up to the present time by the insertion, in their proper places, of all methods of interest. Volumetric methods of analysis have increased to a very large extent during the past few years. It will be within the memory of most chemists, when volumetric methods were looked upon with a certain amount of misgiving, and this was certainly the feeling when Mr. Sutton was bold enough to put his first volume in print. How things have changed since then—we feel bound to say that with ordinary gravimetric methods, the routine work of a large chemical establishment could not be carried on, so that the importance of volumetric analysis may be seen at a glance by all those who have not even devoted much time or thought upon the subject.

The handbook before us is a work invaluable to all chemists engaged in any chemical industry whatsoever. In it may be found methods of analysis most minutely described, so that even the tyro may perform most of the operations. Chemical works in this country are not, as a rule, fitted up with a library and reading room, as most of them are abroad, any spare room is usually considered fit, in which to stow away the chemist; but if there is no shelf on which books of reference may be placed, we advise the chemist to find room for Mr. Sutton's book at home.

As we have said before, the work is brought up to date. In it may be found most of the applications of phenolphthalein for use in titrating carbonate and caustic alkalies, the valuation of acetates of lime by the phosphoric acid method, manganese estimation by Pattinson's method, and most of the work which Dr. Lunge has of late years contributed to volumetric analysis.

A very useful chapter, which may be studied with advantage by those engaged in water analysis is that on oxygen, and Messrs. Williams and Ramsay's modification of Schützenberger's method with hyposulphite may prove of considerable importance in determining the quality of a water. Manure chemists will find the chapter on phosphoric acid interesting; but strange to say, we do not find the word manures in the index.

A mass of new matter has been added to this present edition, so that the purchasers of former editions will find ample value in another outlay.

At page 460 we find a lengthy description of Thomas' gas apparatus, leading us on to a description of the more recent Keiser's system, and to Hempel's method, all of which are very clearly explained.

The index might have been much more complete, perhaps this will be rectified in another edition, still the systematic manner in which the contents generally have been treated, will make up, no doubt, for any omissions in the index.

We feel bound to say that no chemist, using volumetric methods, would care to be without this work, if he once cast a glance over the contents of this, the fifth edition.

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## PEROXIDE OF HYDROGEN AS A MEANS OF BLEACHING WOOD.

BY DR. P. EBELL.

At the first glance it certainly appears strange that peroxide of hydrogen, which hitherto has only been used for bleaching finer articles, although to a constantly increasing extent, should be proposed as a means for bleaching wood. There are, however, a few special cases in which the increase in value which is connected with the bleaching of the wood without entailing any structural alteration, is so important that both the cost of the peroxide, as well as that arising from the method itself, are hardly of any perceptible importance. Woods of 1 to 5 mm. in thickness can be bleached in a few days, while thicker planks require a longer action of the bleaching bath, inasmuch as it not only becomes a matter of importance that the bleaching fluid should be internally diffused throughout the wood in order that its action should be thoroughly efficacious, but also in order that the newly-formed soluble products of oxidisation should receive ample time to pass over into the fluid. A preliminary treatment of woods for the bleaching process, more especially as regards those already dried, has hitherto not led to any satisfactory results, as neither with dilute solutions of caustic or carbonated alkalis, nor by means of dilute acids can we remove the major portions of the inspissated colouring matters without doing injury to the body of the wood itself. For green wood, on the other hand, the method of systematic evaporisation would give good results, and would doubtless lead to a considerable saving of peroxide during the subsequent process of bleaching.

As regards the composition of the bleaching bath, it has been determined that the peroxide in an acid or neutral solution acts but very slowly on the colouring materials of the wood. On the other hand, however, alkaline, more especially ammoniacal, bleaching baths have been found to possess greater bleaching power. Corresponding with this, the bleaching baths were produced with 3 per cent. peroxide with ammonia solution (one litre of 3 per cent. peroxide and 20 grammes ammonia solution of 0·910 sp. gr.), and the dry wood was submerged in this fluid.

Two experimental rows were placed alongside of each other, the one at an ordinary temperature (about 17° C.), the other at about 34° C. Every six hours the contents of peroxide in the bleaching bath was determined, while the progress of the bleaching was compared with the same. In order to determine the contents of the peroxide in the baths, the method of titration with permanganate was called into requisition. The following figures were the result :—

| | At 17° C | 34° C. | |
|---|---|---|---|
| One c.c.m. of the bleach bath corresponded at the commencement ... ... ... ... | 19 c.c.m. ... | 19 c.c.m. | N/10 Permanganate, |
| After 6 hours ... ... ... ... | 14 ,, ... | 5 ,, | |
| ,, 12 ,, ... ... ... ... | 11 ,, ... | 3 ,, | |
| ,, 24 ,, ... ... ... ... | 6 ,, ... | 0·2 ,, | |
| ,, 48 ,, ... ... ... ... | 4 ,, ... | ,, | |
| ,, 8 days ... ... ... ... | 3 ,, ... | 0 ,, | |

After a short time the alkaline reaction of the bleaching bath disappeared, giving place to an acid one. Apparently acid combinations arise from the process of oxidation, which have been neutralised by the ammonia present. By means of a subsequent addition of spirits of ammonia in small quantities, however, an alkaline reaction of the bleach baths rendered them permanently active.

The slabs of wood treated at the heat of 34° C. lose the colouring materials the soonest, however, the development of oxygen which takes place in the solution proves that a portion of the oxygen of the peroxide becomes under these circumstances, displaced without being utilised. The bleach bath in the cold only presents the above appearance to a moderate or even weak degree. The bleaching of the wood certainly proceeds more slowly, but the final effect or result was most decidedly more complete. In both cases the

bleaching fluid attained a weak yellow brown tint, becoming clouded with flake-like amorphous separations, while a peculiar smell arose, reminding one of turpentine.

The bleaching process was concluded in about ten days, the blocks or slabs of woods appearing almost completely white and transparent. On being slowly dried in the air the effects of the bleaching became still more apparent. The wood had not been subjected to the slightest alteration whatever in its structure, the smooth surface remained intact, while the grain and veining appeared even more sharply marked than previously, but without any colouring. No alteration whatever took place in the length or breadth of the wood, although a considerable loss in weight was experienced. The resisting power of the bleached wood against breaking and working does not appear to have been altered; but, on the other hand, the absorbing (suction) power for impregnating fluids, as for instance, oils and varnishes, was considerably increased.

The quantities of peroxide of hydrogen which were found to be requisite for bleaching wood were as follows:—

500 wood slabs 1·5 mm. thick.

250×20 mm. 2·5. q.m.

required 2·5 kilog peroxide solution, consequently for one square meter—one kilog peroxide solution, corresponding to a value of Mks. 0.60.

Where it is possible to be constantly bleaching, and to systematically use several bleach baths alongside each other, then the quantity of peroxide used could be decreased by a half or a third. If, however, the bleaching of rough woods with peroxide becomes out of the question on account of the expense, this fact would not, however, seriously affect such cases where the cost of the wood itself is of less importance; while, on the other hand, specifically favourable qualities are demanded which will not stand in the way of the utility and working of the wood.

The bleaching of woods by means of peroxide for the following purposes, whether the wood be in a worked-up or crude form, will become useful in course of time for the following purposes:—

(1) Wood carvings for sticks, pipes, tong handles, figures, fret-work, furniture, etc.

(2) Rules, knife handles, surgical, chemical apparatus and instruments.

(3) For musical instruments, such as pianos, violins, flutes, etc.; in short, where great stress is laid upon an improvement in the power of resonance and generation of greater resisting power against climatic influences.—*Chemiker Zeitung*.

# Trade Notes.

Pyridine Bases.—The s.s. *Silvia* on the 10th of December took out to Hamburg, from the port of London, five runlets of pyridine bases, valued at £110. On the 14th, the *Ella* took six casks to Rotterdam, value £161, while on the next day the *Maasstroom* took eight casks to Rotterdam, valued at £197.

New Companies.—The following new companies have been recently registered:—Clamond Incandescent Gas Light, £200,000 in £1 shares; Ellen and Mary Coupe (chemical manufacturers), £2000 in £10 shares; Huelva Chemical and Cement Works, £75,000 in £1 shares; Oak Tanning, £30,000 in £20 shares; Trinidad Cocoa and Chocolate, £25,000 in £5 shares.

What the Russian Press says of the Chemical Trade Journal.—The *St. Petersburger Zeitung* (which is in its 161st volume,) says:—"The *Chemical Trade Journal* is the title of a newspaper appearing weekly in the English language (edited by George E. Davis, 42, John Dalton-street, Manchester), which is distinguished by its extremely rich, copious, well-selected and highly interesting contents. All branches of the wholesale chemical industry are here discussed, all new discoveries and processes critically explained and indicated. Each number furnishes the prices current of the English chemical market, reports upon new books, etc. After having perused this journal from its commencement, we can heartily recommend it to the attention of our readers."

A Correction.—No, Henry, it is not Mr. Ferdinand Hürther who is consulting chemist to Messrs. Gaskell, Deacon and Co., nor is Mr. Eisleman the chemist to Messrs. Peter Spence and Sons. Their names are Hurter and Esilman respectively. Please be good enough to make this correction.

Mrs. Gamp in Crane Court, Fleet Street.—What is the matter with the old lady? Has she lost her umbrella? We would advise her to send her reporter to "interview" speakers on gas matters, and not trust so much to paste and scissors.

## A NEW "SOURS" FOR BLEACHERS.

THE action of the makers of muriatic acid in putting up the price of tower salts, has caused quite a commotion in the bleaching trade, and many firms have been racking their brains as to how they can reduce their consumption to the lowest possible limit. In other directions also a stimulus has been given to invention, and one firm has brought out a new "souring" agent for use in bleaching which can be sold at a less price than ordinary tower salts.

The Marple Chemical Company have sent us a sample of what they call their "Patent Sours" which, though being cheaper than ordinary tower salts, will do as much work in "souring," bottle for bottle, as ordinary muriatic acid. We have tested the acidifying power of the new reagent, and can testify that either for souring after the lime stew, or for sours after "chemick," it may be used in the same proportion as tower salts are now used. It is of a higher specific gravity than ordinary "salts," but this has nothing to do with its souring properties.

One of the reasons alleged for the recent rise in the price of muriatic acid, is that it had come to the knowledge of the association that the muriatic acid was being purchased for chlorine making, and therefore it was decided to put up the price to such a figure that it would no longer pay to do so. Surely the association has been hoaxed. We hear a good many things, but we have not yet heard of any manufacturer who would be foolish enough to buy muriatic adid at sixpence per carboy, plus the carriage, for making chlorine intended for use in bleaching, except for new processes.

## PYRIDINE.

IN Lunge's work on "Coal Tar and Ammonia," p. 152, pyridine is described as a colourless, mobile fluid, of penetrating smell. It has a specific gravity 0·9858 at 0° C., boils at 115°–116°·7 C., and possesses the formula $C_5H_5N$. It is miscible with water in all proportions, from which solution it is reprecipitated by caustic potash or caustic soda. It resists the action of chromic acid, and fuming nitric, but forms stable salts readily soluble in water and alcohol, which can be dried at 100° C. without decomposition.

Pyridine has during the past few months assumed a certain degree of importance. It has been largely used in Germany as a medium for methylating spirits of wine for use in trade, as it has been found that the mere admixture of wood spirit was not a sufficient deterrent to prevent the ordinary methylated spirit from being imbibed. The admixture of pyridine certainly should prevent this, as it possesses a most disagreeable and penetrating odour. The German press, however, does not like the introduction, and has been loud in its declamations against the new system. On the other hand, if Germany succeeds, it is very probable that France will follow suit, and in that event there would be a very large demand for pyridine.

The specific gravity and the boiling point of pyridine point to its being contained in the products of coal-tar distillation up to the specific gravity of water, but it is also certain that some exists also in the higher creosote oils, mixed, however, with members of the quinoline series,

Pyridine now fetches from 8s. 6d. to 12s. 6d. per gallon. It is not pure pyridine, but is sold on the basis of 90 per cent. distilling at 140° C., being water white, soluble in all proportions in water, and leaving no residue when evaporated to dryness.

Whether it will pay an ordinary tar-distiller to make this commercial pyridine, or whether he should separate a crude article for sale to a refiner, is a question which can only be settled by each individual distiller; to most we would say, separate the crude article and have done with it. The question of packages, too, should be considered, as we understand it cannot be sent away in ordinary wooden puncheons.

In order to prepare crude pyridine, the light oil, and in some cases even the crude naphtha is to be treated with sulphuric of 1·25 sp. gr. or 50° Tw. with violent agitation for at least an hour. The mixture is allowed to settle, and the clear liquor drawn off and boiled in a lead-lined vessel in a current of open steam. This treatment with open steam

expels the mechanically dissolved hydrocarbons, but causes the deposition of a large amount of flocculent matter.

The liquid must now be filtered through linen cloths, and a very strong solution of caustic soda added in excess, which causes the separation of the pyridine and other bases. The alkaline solution is now to be distilled with open steam, during which operation the bases go over with the steam and form a layer on the top of the condensed water in the receiver. It is in this condition that a crude pyridine may find a ready sale with the refiners.

The lighter portions of the creosote may also be treated in the same manner for crude quinoline bases, for which there appears to be a growing demand.

## AMMONIA-SODA VERSUS LEBLANC SODA FOR BLEACHING.

MANY bleachers have complained to us that ammonia-soda, as well as highly refined, and carbonated soda-ash made by the old Leblanc process is not as active as the old-fashioned Lancashire ash in "killing the motes" in the cloth. This is no doubt true on account of the small amount of caustic soda which refined ash contains, but if they would treat the ash in a certain manner, the one no doubt can be made to do as much work as the other. Instead of putting the solid ash in a kier, the more sensible way would be to previously dissolve it outside the croft altogether, and so to form a solution containing any amount of causticity required. This may be easily done by dissolving the ash to form a 24° Tw. solution, and boiling up for a short time with a little quicklime. One hundredweight of soda-ash, of 50%, and about eight pounds of quick lime will make a splendid lye for the bleachers' use. Of course the boiled liquor must be allowed to settle and all the clear liquor run off into the croft, direct into the kier. A little arrangement would make the labour easy and far more cleanly than the present system as employed in most works.

## THE COPPER SYNDICATE IN PARIS.

THE great copper "corner" is widening out in its developments, and not only is a big Bourse affair, but agitates the industrial world, and may force on events on which those who organised it do not seem to count. The syndicate just formed is of an exceptionally strong kind. According to its articles of agreement it is to last two years, and to trade only in buying and selling copper on its own account, and on that of mining companies which may join it. The two years clause is a formidable fact. In America "trusts" and "pools" and "rings" of the gigantic sort do not get so much in the way of the outer public as they do here, because the United States afford such vast elbow-room and scope for individual exertion. In France things are different, and, as a deputy said, "The new Copper Syndicate is playing with fire in a crowded and, financially speaking, hampered country with revolutionary predilections." The rise in copper is already a source of considerable distress in the busy quarters, and directly or indirectly affects all industries, but none more than those connected with the national armament. The Mint waits on the will of the syndicate for its intended issue of copper coins. So do brass founders, bronze casters, and gas-fitters, to say nothing of those braziers who supply cooks with their indispensable kitchen requisites. The calculations on which the military and navy estimates are based are upset, and the cry in the arsenals is, "How are we to go on making cartridges on the new model?" Means are being taken to force the government, when the Chamber meets, to take action against the syndicate. The people of Paris are nearly certain, should the screw be tightened further, to come forward. The copper crisis might take dangerous devolpment. There is a law of the Convention against *accapareurs*, or "rings" which concert to create artificial monopolies, but it is obsolete, because Draconian. However, the letter and spirit of French legislation are hostile to concerted action having for its object to check freedom of sale or of purchase.

## A STORY OF "GOLD IN WALES."

MR. Wilbraham Taylor, of Hadley Hurst, in a letter to the *Times*, relates the following experience:—About the year 1860 a bustling little Welshman entered my room in London, and, after making sure we were alone, undid a heavy parcel tied up in a coloured bandana, displaying a lump of rock, and, almost bursting with conscious importance, said: "There, you see before you Thomas Aquinas (I have forgotten his real name), soon to be the richest man in the Principality, if not in the three kingdoms. Yes, sir—by the way, my cab is at the door, and I have come without any change. Just lend me a shilling. Thank you! Well, sir, I was about to tell you that to my wealth—in prospect, it is true, but I might almost say I hold it here in my hand—the wealth of all the Rothschilds is as nothing. Look at that piece of quartz? You may almost pick the gold out of it. It is but the sample, taken at hazard, of many acres, the freehold of which I have secured. To lay down the necessary machinery is a matter of a few weeks; abundance of water, good roads, and a railway station within so many miles; but I shall soon lay down my own line. My principal difficulty will be to find trusted labourers who will not rob me. Poor, dear soul! I have brought Mrs. Aquinas up to town that she may see something of London. The Queen's balls and drawing-rooms, I fear, are over for this season. You will come and see her? We have the first floor suite at —— Hotel, the corner of —— square." I noticed here that his portly little figure was buttoned up to the throat, leaving little evidence that his last shirt was not at the laundress's. Then he added, with ineffable greatness, "She will soon have her own carriage and her town house, as well as her country house, and no one will look better in them than she will, poor dear. Do call on her at ——square. Remember, first floor. Of course, if I were to exhibit that block at the Mansion House the whole Stock Exchange would be at my feet, begging to have an interest in the enterprise; but it would be more becoming, in the humble position I now occupy, to keep it all to myself and wait. They will soon hear of me. Of course you will come and see us, corner of ——square. Do not forget ——square, first floor suite of rooms. By the by the landlord has asked me to settle my little bill—a mere trifle of £20 or £30,—and my money has not come up from the country yet. Could you oblige me with a cheque for only a day or two?" It is, perhaps, unnecessary for me to say how much I was grieved that I could not lend it him. He assured me that he was not asking for "thousands"—these he would have before a few weeks were out,—but only £30, just for a day or two—£20 even would do. A few days after I duly called on Mr. Aquinas at ——Hotel, and was besieged with questions. Did I know them, etc. I said I knew him a little, and believed him to be a very respectable man. Well, but they have left the hotel, promising to send a cheque in a day or two, but ——. I really think they are honest, well-intentioned people, and I hope you will get your money. I have never heard of my little Welsh friend since that time, nor have I called to inquire at —— Hotel, drawing-room suite, first floor.

## NOTES ON GLASS BOTTLES.

COULD the process of glass blowing be cheapened, as is promised by the result of recent trials of new mechanical appliances, glass vessels might be used for several purposes for which tin is now employed. Foreign fruits, for instance, might be preserved in glass bottles hermetically sealed. Preserved fruits now come to England in tins. With the utmost care in packing and sealing the tins cannot be described as free from danger. There have been cases of poisoning from eating tinned fruit. If glass could be produced as cheaply as the tins preserved fruit might become a popular article of commerce. Sugar and fruit are plentiful and cheap in distant countries. Bottled fruit would sell much more readily than tinned fruit. It would be perfectly wholesome. Moreover, the bottles could be cleansed and used again, or if damaged in opening they could be melted and re-made. Hitherto invention has done little for glass manufacture. As far as method is concerned, the manufacture has known no change of moment. Appliances have improved, but glass has still had to be blown by mouth, which is an exhaustive and expensive process. Mr. H. M. Ashley's new machine, which a Castleford Company is introducing, proposes to do away with the glass blower, and all the risks and pangs of his occupation. The machine will make a single glass bottle in six seconds. In an improved form it will make from sixteen to twenty-four bottles in a minute. What an enormous output this implies may easily be calculated. It means that in a working day of ten hours one of these machines will produce 144,000 completed bottles, or twelve hundred dozens. More

important than this, however, is the diminished cost which will accompany the increased power of production. Bottles which now cost 3s. 10d. per gross for labour are to be made at a cost of threepence per gross for labour. This is more than reform; it is revolution. It ought to bring back the glass bottle trade which England has lost, because of the more favourable terms on which the cheap labour countries compete with us. At present Great Britain is nearly at the bottom of the bottle-producing countries. The most favourable estimate puts the value of the yearly production in millions of francs as follows:—Belgium 49·2, Austria-Hungary 41·5, Germany 40·5, Great Britain 28·2, France 22·7. When the quantities manufactured come to be considered the adverse balance against Great Britain is still heavier. British are more expensive than foreign bottles, and therefore a comparison of quantities shows Great Britain to a greater disadvantage than a comparison of values. It is estimated that the daily output is 46,000 gross for all countries, and that Belgium and Germany produce 30,000 gross, while Great Britain's share is but six thousand gross. In these estimates are included all vessels coming under the generic term of bottles, from vitriol carboys to apothecaries' phials, from whisky bottles to jam jars. If the promises made on behalf of the new machine hold good, the relative positions ought to be reversed. Great Britain ought to become the great bottle-producing country, underselling foreigners in their own markets, even as they now undersell us.

# Queries and Replies.

Cement.—Could any of your readers inform me of a good cement for caulking gas valves of a Siemens' producer, where the temperature is about 400° F.—Enquirer.

Lime Mud.—I should be glad if any subscriber could tell me how much soluble soda is now left in the lime mud from the filters after causticising in an alkali works.—Paper Maker.

Bleaching Powder.—How much bleaching powder can be practically made from 100 tons of sieved lime?—G. G. C.

Gas Purification.—Can "blue billy" be used in any way for purifying gas from sulphur?—A Gas Manager.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

Yesterday was observed as a close holiday throughout Scotland, works and offices alike being shut. Many of the former stopped before the close of the week, and the greater part will remain closed till to-morrow morning, at the earliest. In the absence of the usual register of transactions carried through, the chemicals market, like the others, stands as an unknown quantity partly, but a very fair guess may be made. There has been very little of change going on, and the values approximately stated below, will, on the full resumption of business towards the close of this week, be found not wide of the mark. A feature which has more and more crept into notice over the past year, as touching the local manufacture, is the growing favour among dyers and others for bichromate of soda, and the corresponding decadence of the dearer bichromate of potash, for which it was at first advanced as an inferior substitute. This symptom is not fully welcome to the Scotch makers of bichromates, because the Germans compete with them in bichromate of soda, but not in the other. One of the Scotch Mineral Oil Companies (an industry out of which investors have of late been clearing at break-neck speed), has just announced a dividend at the rate of 20 %. This can hardly be taken as betokening a trade quite gone off to evil courses. Chief prices current may be stated thus:—Soda crystals, 40s. net Tyne; alum, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £46 net Glasgow; Soda ash, 48/52° 1d., less 5 % Tyne; caustic soda, white, 76° £9, 70/72° £7 2s. 6d., 60/62° £6 2s. 6d., and cream, 60/62° £6, less 2½ % Liverpool; bicarbonate of soda, five cwt. casks, £5 15s., and one cwt. casks, £6 net Tyne; refined alkali, 48/52° 1½d., less 2½ % Tyne; saltcake, 22s. less 2½ % f.o.r. Glasgow; bleaching powder, £7 17s. 6d. less 5 % f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 % and 6 % to Scotch and English respectively; nitrate of soda 9s. 1½d. prompt to 9s. 3d. forward; chlorate of potash 6½d. less 5 % any port; sulphate of ammonia £12 5s. and £12 7s. 6d. f.o.b. Leith; paraffin scale, hard 2½d., soft 2d.; paraffin wax 120°, semi-refined, 3d., and re-melted 2½d.; paraffin spirit 7d.; burning oil (mineral) 6d. to 8d.; lubricating oil (mineral) £5 15s. to £7 10s. Sulphate of copper variable at about £22. Clyde imports for the week included 1,286 tons pyrites of copper, 1,000 tons brimstone, 6,050 tons iron ore, 160 tons bones, and 5,747 bags bone meal.

## THE ALKALI MARKET.

Nothing appears of an encouraging nature in the alkali trade, for with saltcake ruling at 21s. and even less, it is very certain that the profit, if any, must come from other materials. There is, however, a very large profit on bleach, so large in fact that every inducement is offered to the patentees of other processes than those now in use, to perfect their methods. The Hermite Electrolytic process is, we hear, succeeding at a mill in Belfast, and when a few practical details are worked out, we shall hear more about it. All the statements of Messrs. Cross and Bevan seem to have been realised. The ammonia-soda process is still making good profits, and despite evil report, the Cheshire Alkali Co. are proceeding with their plans in a methodical and unostentatious manner. We have been shown invoices of Leblanc soda (50 %) costing the consumer less than £4 delivered into his works, considerably less, so that it is easy to see the nature of the struggle which is now going on; even caustic soda has been sold for delivery over 1888 at less than £6 17s. 6d. for 70 %. The recent rise in the price of crude muriatic acid or "tower salts," is certainly a great mistake, as was also the issue of the circular to which we referred last week. It has certainly succeeded in getting the consumers' backs up.

## MISCELLANEOUS CHEMICAL MARKET.

Values all round are well maintained, and in many branches of the trade there is decidedly a firmer tone. In ammonia and its salts an advance may be looked for if the present rise in "sulphate" is continued. In the meantime, however, carbonate, muriate, liquid ammonia, etc., are without change at prices noted in our list of prices current. Firmness in the copper market keeps sulphate of copper at £22 to £23; the prices being a little irregular in consequence of re-seller's parcels finding their way into the market. Lead is firm. Litharge, white lead, nitrate and acetates of lead, are moving off freely at current quotations. Coal-tar products still continue in good demand. Crude carbolic is firmly held at 3s. 10½d. to 4s.; and crystals, 35°, are quoted 1s. 2d. ℔ lb nett. Picric acid 1s. 5d. ℔ lb. Aniline oil and salt are again dearer owing to further advance of benzol, quotations are now 10d. and 9d. respectively. Bleaching powder has hardened again in price, and £7 17s. 6d. to £8 f.o.b. Liverpool and Tyne; and £7 10s. to £7 12s. 6d., rails Lancashire, are to-day's quotations. Caustic soda and alkali generally are quiet and without change in prices. Acetic acid and acetates are in good demand, Brown acetate of lime firm, at £10 ℔ ton (Lancashire) and £9 15s. c.i.f. English ports. Grey acetate of lime is rather scarce. Tannic acid is rather dearer. Oxalic sells slowly at 4½d. ℔ lb. Prussiates of potash and soda are quiet. Bichromates are selling freely, and chromic acid is in good demand at 4½d. ℔ lb.

## THE LIVERPOOL MINERAL MARKET.

Prices generally have been maintained during the week; the manganese imports have been small and prices unaltered. Magnesite, 30s. to 35s.; bausite, 12s. to 20s., according to quality. Dolomite, 7s. 6d. per ton at quarry. French chalk, 82s. 6d. Carbonate of barytes, 90s.; small, 50s. to 60s. Pumice, lump £9. Purple ore, 6s. Emery stone, £5 5s. Fullers' earth, 45s. to 50s. Tungsten metal, 2s. 6d. ℔ lb. Asbestos, £17 to £18; lower qualities, £14 to £15. Calamine, 60s. to 80s. Sulphate of strontia, 18s. 6d.; carbonate, £15 to £16. Plumbago best Ceylon lump, £25 to £35; other qualities, £4 to £12 per ton. Ferromanganese 80 %, £11 12s. 6d.; 40 %, £7 5s. Spiegel, 20 %, £4 12s. 6d.; Silicon Spiegel, 9 %, £8. Chrome pig, 9 to 10 per cent., £8 to £8 10s. Bitumen, finest £35, prime £18 to £23; lower quality, £8.

## THE SULPHATE OF AMMONIA MARKET.

The holiday feeling has not prevented a further hardening of values, and evidence is forthcoming that consumers are relinquishing their notions of cheaper purchases early this year. It is very strange how scarce sulphate keeps, and this fact must conduce to forcing prices to an extreme point in the Spring, unless some relief is obtained in one way or another. A favourable feature, too, is the improvement in nitrate prices, in spite of the heavy shipments, and which make the present level of sulphate figures less conspicuous.

So the outlook for manufacturers is once more a cheerful one, more so than it has been for some time, and of course values compare very favourably with the past two years, when, at the end of December they stood f.o.b. Hull at :—

| 1885. | 1886. | 1887. |
|---|---|---|
| £10 7 6 ..... | £10 17 6 ..... | £12 7 6 |

Stocks of sulphate are now less than they have been for several years past, and a continuance of the exceptionally bright weather experienced so far this winter will not allow them to be increased, so that in fact the tables are more or less turned upon the consumers. The cry will now be "Consumers beware!" and not "Producers beware!" as was the case when the standard of over-production was raised. At this crisis, however, it behoves producers to remain calm, as the elevation of prices too much would eventually be productive of more harm than good. Too rapid a rise may bring about a still more serious fall, and prices between £12. 10s. and £13. must for the time be considered thorough good ones for prompt delivery, and producers should be content with the good the present course of events brings them in the natural order of things; everything artificial should be avoided.

This week's values may be said to have reached £12. 17s. 6d. f.o.b. Hull, and a similar price for London, Leith and Liverpool standing at £12. 16s. 3d.

## THE TAR PRODUCTS MARKET.

Surely 90's benzol must be a warm corner for some of the speculators, when without any valid reason the price is declared sixpence higher than last week. We cannot hear of any consumers purchases at these prices, the whole of that which has recently changed hands going in one direction, save that small quantity which is being purchased by those who work from hand to mouth. Surely tar distillers have now nothing to grumble of, and if they are wise—and able to find purchasers—surely now is the time to contract for benzol sales throughout the year, ere the "Talk" 12,000 gallons per month comes down upon them from the 300 retorts which are now working there. 50/90 benzol and solvent are firm and should remain so, as carbonising ought not to affect these. Creosote is fetching 1¼d. to 1¾d. at the maker's works; anthracene firm at old prices. Carbolic acid, crude, at similar prices to last week, while pitch is still utterly neglected.

# Gazette Notices.

### BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Bailey, Joseph, The Monkstone and Langstone Mines, Brenton, the New Phœnix Mine, Altarnum, the Wearde Quarry, near Saltash, the the Manganese Mills, Millbay-docks, Plymouth, and Camplehay, near Tavistock, mine proprietor and manganese merchant. December 20.

Best, Thomas Samuel, trading as T. S. Best & Co., 5, Wycliffe-grove, Argyle-street, 192, High-street, and Albert Saw Mills, St. James-street, Hull, postal block and sample bottle merchant. November 29.

#### First Meetings and Public Examinations.

Goodman, Zachariah Walter, The Soap Works, Barking, soap maker. First meeting, 33, Carey-street. Exam., Shirehall, Chelmsford.

Best, Thomas Samuel, trading as T. S. Best & Co., 5, Wycliffe-gyove, Argyle-street, and 192, High-street, and Albert Saw Mills, St. James-street, Hull, postal block and sample bottle merchant. First meeting, Official Receiver's, Hull. Exam., C.C., Hull, January 9, at 2.

#### Adjudications.

Goodman, Zachariah Walter, The Soap Works, Barking, soapmaker, December 14.

Best, Thomas Samuel, trading as T. S. Best & Co., 5, Wycliffe-grove. Argyle-street, 192, High-street, and Albert Saw Mills, St. James-street, Hull, postal block and sample bottle merchant. November 29.

#### Notices of Intended Dividends.

Koe, Frederick Pemberton, & Charles Ithell Bethell, trading as John Bethell & Co., 38, King William-street, London, West Bromwich, Bradford, near Manchester, and Kingsden and Northwall, Dublin, also Great Grimsby and Greenwich, tar distillers. Proofs by January 4. Tr., Henry Bishop, 41, Coleman-street.

Ives, George, New Scarborough, near Wakefield, grease manufacturer. Proofs at once. Tr. John B. Otley, O.R., Wakefield.

Koe, Frederick Pemberton (separate estate, Montpelier House, Blackheath, tar distiller. Proofs at once. Tr. Henry Bishop, 31, Coleman-street.

Beththell, Charles Ithell (separate estate), Goodacre, Weybridge, Surrey, tar distiller. Proofs at once. Tr. Henry Bishop, 41, Coleman-street.

#### Notices of Dividends.

Fleming, Ernest Laremont, 4, Olive Mount, Wavertree, and Old Swan, Liverpool, borax manufacturer. First and final, of 10d., at Henry D. Eshelby's, trustee, 24, North John-street, Liverpool.

Mangles, John, trading as John Mangles & Co., Lansdowne-road, Didsbury, and 39, Major-street, Manchester, drysalter. Of three sixteenths of a penny (supplementary), at James Eckersley's, trustee, 16, Pall-mall, Manchester.

#### Order made on Application for Discharge.

Mordle, Frederick, Norton Fitzwarren, Somerset, starch manufacturer. November 7. Discharged as from January 7.

#### Appointment of Trustees.

Cooke, William, and Mary Katherine Cooke (trading as M. K. Kerr & Co.), Albion Dry Dock, Swansea, Glamorgan, oil refiners and grease manufacturers. Tr. John F. Harvey, Goat-street, Swansea.

#### Distribution of Assets of Deceased Persons.

Parry, Morris, Broadway, Deptford, and Lewisham High-road, soap manufacturer, died November 30, 1883. Claims to John Ashbridge, 238, Whitechapel-road, solicitor, by January 7.

Salmon, Horatio John, formerly of the Britannia Works, Drummond-road, Bermondsey, chemical and general manure merchant and manufacturer, and Frensham, died May 23. Claims to Brount, Lynch, and Petre, Fitzalan House, Arundel-street, Strand, solicitors.

### THE BANKRUPTCY ACT, 1869.

#### Bankruptcy Notices.

Cottrell, Frederick William, & Frederick Greening, 7, William-street, Neate-street, Camberwell, formerly Aylesbury, chemical manufacturers, trading as Cottrell & Co. and The British Espartonite Co. First and final dividend of 3d. in the pound paid. Bankruptcy closed March 2.

Davey, William, Gainsborough-road, Hackney-wick, Dampier's Dock, Barking, and Palmerston House, Buckhurst-hill, tar distiller. Claims by December 30. Tr. T. S. Geere.

#### Dissolution of Partnerships.

Higgin, W. & A., & Co., Soapery-street, West Gorton, near Manchester, manufacturing chemists. October 30. Debts by Alfred J. Higgin, who continues the business.

Farnworth Pith and Size Co., New Mills, Farnworth, near Widnes, and 44, Lloyd-street, Manchester, manufacturers of prepared pith, glue, size, etc. December 19. Debts by William Milne, who continues the business.

Grimes, Alfred, & Son, Frederick-street, Bury, Lancaster, drysalters. December 20. Debts by Alfred Grimes, who will carry on the business.

Seward & Young, Eagle Works, Wallis-road, Hackneywick, colour, varnish, and printers' ink manufacturers. December 24.

Hargreaves, W., & Co., Tividale Works, Tipton, refiners of tallow and soft soap makers. December 6. Debts by Charles W. Cardall and Alfred Y. Cardall.

Clay, Dod & Co., 52, St. Ann-street, Liverpool, wholesale druggists and manufacturing chemists. December 7, as regards Richard U. Merrett. Debts by Thomas H. Dod, William H. Leatham, Joseph T. Shipton, Thomas F. Driver, and Arthur Pettitt, who continue the business.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Consuming Smoke.** Arthur Lucas Chance. 17614. Dec. 22, 1887.
**Mineral Washing Machines.** Charles Mitchell. 17625. Dec. 22, 1887.
**Disposal of Town's Refuse.** J. B. Alliott. 17630. Dec. 22, 1887.
**Petroleum Engines.** J. H. Knight. 17638. Dec. 22, 1887.
**Purifying Water.** A. H. Hobson and C. H. Rosher. 17650. Dec 22, 1887.
**Alkaline Carbonates.** W. W. Staveley. 17657. Dec 23, 1887.
**Gas Carburettors.** R. S. Lawrence. 17676 Dec. 23, 1887.
**Saccharum for Brewers, etc.** J. W. Bailey and J. A. R. Greaves. 17696. Dec. 23, 1887.
**Separating Liquids from Solids.** J. S. Sawrey and Harold Coleet. 17712. Dec. 24, 1887.
**Combustion of Smoke.** W. Roberts. 17716. Dec. 22, 1887.
**A Novel Elastic Substance.** H. M. Steinthal. 17732. Dec. 24, 1887.
**Petroleum Engines.** G. W. Weatherhogg. 17738. Dec. 24, 1887.
**Petroleum Engines.** T. C. Hogg. 17744. Dec. 24, 1887.
**Preserving Milk.** J. B. Guérin. 17746. Dec. 24, 1887.
**Coating Metals.** J. Westgarth and W. Charnock. 17754. Dec. 24, 1887.
**Applying Mechanical Refrigeration.** W. L. Williams and S. Puplett. 17756. Dec. 24. 1887.
**Improved Roofing Material.** J. A. Archer. 17767. Dec. 24, 1887.
**Coating Metal Plates.** John Lysaght. 17770. Dec. 24, 1887.
**Hydrochloric Acid from Calcium Chloride.** John Plummer. 17772. Dec. 27, 1887.
**Extracting Juice from Sugar Cane.** J. H. Man. 17793. Dec. 27, 1887.
**Generating Gas.** H. Hutchinson. 17799. Dec. 27, 1887.
**Zinc Smelting Furnaces.** F. Rigand. 17809. Dec. 27, 1887
**Colouring Matters.** Meister, Lucius, and Brünning. 17811. Dec 27, 1887.
**Mordanting, Dyeing, and Steeping Fabrics.** W. Hampe. 17878. Dec. 29, 1887.
**Separation of Solids from Water.** B. E. R. Newlands and J. B. Alliott. 17880. Dec. 29, 1887.
**Metallurgical Blowpipe.** E. Jolicard. 17898. Dec. 29, 1887.

# PRICES CURRENT.

[Thursday, Jan. 5, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6⅞ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 11 | 6 |
| Chromic, 85 % ... ... ... ... ... per lb. | 0 | 0 | 4½ |
| Fluoric ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 3 | 0 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 4½ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... ... ... per ton | 12 | 0 | 0 |
| ,, (Brimstone, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, ( ,, 150°) ... ... ,, | 1 | 17 | 6 |
| ,, (Pyrites, 150°) ... ... ... ,, | 1 | 6 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 7 |
| Arsenic, white powdered... ... ... ... per ton | 10 | 12 | 6 |
| Alum (loose lump) ... ... ... ... ... ,, | 4 | 13 | 9 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 10 | 0 |
| ,, ,, (medium qualities).. ,, | 4 | 15 | 0 |
| Ammonia, ·880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Sulphate (grey), London ... per ton | 12 | 17 | 6 |
| ,, ,, (grey), Hull ... ... ,, | 12 | 17 | 6 |
| Aniline Oil... ... ... ... ... ... ... per lb. | 0 | 0 | 10 |
| Aniline Salt ... ... ... ... ... ... ,, | 0 | 0 | 9 |
| Antimony ... ... ... ... ... ... ... per ton | 39 | 0 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1½ |
| Barium Chloride ... ... ... ... ... per ton | 7 | 10 | 0 |
| ,, Carbonate (native) ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 11 | 3 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 5 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 3 |
| Benzol, 90 % ,, ...per gallon | 0 | 3 | 9 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 2 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 3 | 10½ |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 6 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 4½ |
| Coke-oven Oils (crude) ... ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 85 | 0 | 0 |
| ,, Sulphate ... ... ... ... ... ,, | 23 | 10 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 72 | 10 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 32 | 0 | 0 |
| ,, (refined) ... ... ... ... ... ,, | 55 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 1 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 17 | 5 | 0 |
| ,, Litharge Flake, ex ship ... ... ,, | 17 | 0 | 0 |
| ,, Acetate (white) ... ... ... ... ,, | 28 | 0 | 0 |
| ,, ,, (brown) ... ... ... ... ,, | 21 | 0 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 17 | 10 | 0 |
| ,, Nitrate ... ... ... ... ... ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 10 | 0 | 0 |
| ,, ,, (grey) ... ... ... ... ,, | 14 | 10 | 0 |
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | 6 |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ... ... ... ,, | 18 | 10 | 0 |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 10 | 0 |
| Methylated Spirit, 60° o.p. ... ... ...per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 | 0 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 4½ |
| **Oils:—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 5 | 3 |
| Cotton-seed ... ... ... ... ... ... per ton | 20 | 0 | 0 |
| Linseed ... ... ... ... ... ... ,, | 20 | 0 | 0 |
| Lubricating, Scotch, 885°—890° ... ,, | 6 | 10 | 0 |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 | 5½ |
| ,, American ... ... ... ... ,, | 0 | 0 | 6 |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 17 | 6 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 6½ |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | 10 |
| ,, Hydrate (Caustic Potash) ... per ton | 21 | 15 | 0 |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | 0 |
| ,, Permanganate ... ... ... ,, | 4 | 15 | 0 |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % ... ... ... per ton | 9 | 15 | 0 |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 10 | 0 |
| Silver (metal) ... ... ... ... ... ... per oz. | 0 | 3 | 8½ |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | 9 |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 17 | 6 |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 10 | 0 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ... ... ,, | 20 | 10 | 0 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 7 |
| ,, Borate (Borax) ... ... ... ... per cwt. | 1 | 9 | 6 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 3 |
| ,, Hydrate (77 % Caustic Soda)... per ton | 8 | 10 | 0 |
| ,, ,, (76 % Caustic Soda)... ,, | 7 | 15 | 0 |
| ,, ,, (70 % Caustic Soda)... ,, | 7 | 0 | 0 |
| ,, ,, (60 % Caustic Soda, white) ,, | 6 | 0 | 0 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 18 | 9 |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 15 | 0 |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 15 | 0 |
| ,, Manganate... ... ... ... ... ,, | 15 | 0 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | 0 |
| ,, Nitrite, 98% ... ... ... ... per ton | 31 | 0 | 0 |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | 5 |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 2 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 17 | 6 |
| ,, Sulphide ... ... ... ... ... ,, | 9 | 10 | 0 |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 12 | 6 |
| Strontium Hydrate 98 % ... ... ... ,, | 7 | 0 | 0 |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 16 | 3 |
| ,, Cane ... ... ... ... ... ... ,, | 1 | 0 | 0 |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | 8 |
| ,, Barium ... ... ... ... ,, | 0 | 0 | 5 |
| ,, Copper (pure) ... ... ... ,, | 0 | 1 | 4 |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 0 | 0 |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 5 | 0 |
| Tallow ... ... ... ... ... ... ... ,, | 25 | 10 | 0 |
| Tin (metal) ... ... ... ... ... ... ,, | 150 | 0 | 0 |
| ,, Crystals ... ... ... ... ... per lb. | 0 | 0 | 9 |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 21 | 0 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, January 14, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.

## NEW LAWS WHICH CAME INTO OPERATION ON JANUARY 1st, 1888.

SOME of our readers may like to have a summary of several of the Acts which passed through the last session of Parliament and came into operation this year. It is well for every one to familiarise themselves with such Acts of Parliament as even but remotely concern them, so that they may be free from any penalties for non-compliance, and be able to take advantage of any good that may arise from them. For chemists, the Margarine Act stands out prominently, as convictions have already taken place under the new law.

**Margarine.**—For the better prevention of the fraudulent sale of margarine.—Enacts that all imitations of butter shall be sold as "Margarine," and that the wrappers or packages in which they are sold shall be so marked; that the onus of proof shall lie upon the vendor whenever the defence is set up that he believed margarine sold or kept for sale by him to be butter; and that expenses of prosecutions under the Act may be paid from penalties.

**Quarries.**—To provide for the fencing of quarries.

**Water.**—To limit the powers of the water companies to cut off the tenant's water supply where the rate is paid by the landlord.

**Coal Mines.**—To consolidate with amendments the Coal Mines Acts, 1872 and 1886, and the Stratified Ironstone Mines (Gunpowder) Act, 1881.—Consolidates existing law, with important amendments as to construction and use of safety lamps, blasting, timbering, weighing, etc, Establishes two classes of certificates of competency—the first for managers, the second for under-managers—and enacts that daily supervision shall be exercised either by the manager, or the under-manager; the latter having, in the manager's absence, the same responsibility as a manager. Removes, with certain exceptions, the restrictions on prosecution of owners, etc., by workmen.

**Truck.**—To amend and extend the law relating to truck.—Extends the Truck Act, 1831, so as to include all workmen except farm servants; provides that customary and other advances of wages shall be paid without deduction; that orders for goods shall not be considered as equivalent to wages; that dealing at particular shops shall not be made a condition of employment; and that artificers shall be paid in cash and not by barter for certain classes of goods made at home. Also contains provisions as to penalties, etc.

**Fraudulent Marks.**—To consolidate and amend the law relating to fraudulent marks on merchandise.—Enacts that every person who forges any trade mark, or falsely applies to goods or their coverings, labels, etc., any trade mark or colourable imitation of a trade mark, or any false trade description, or who disposes of or has in his possession any instrument for forging a trade mark, or who causes any of the above things to be done, shall be guilty of an offence against the Act; and also that any person selling or having in his possession for sale any goods falsely marked shall be guilty of an offence unless he proves that he acted innocently, and gives all the information in his power to the prosecutor. Persons so offending are rendered liable to fine and imprisonment not exceeding two years, with or without hard labour, and to forfeiture of the articles concerned. The marking on a watch-case is to be considered as applying to the whole watch unless otherwise shown Any person in the United Kingdom who is accessory to the commission abroad of any act which if committed here would be punishable under the Act is rendered liable to prosecution as if he were a principal. Very comprehensive definitions of "trade mark," "trade description," etc., are adopted.

**Compensation for Improvements.**—To provide compensation to the occupiers of allotments and cottage gardens for crops left in the ground at the end of their tenancies.—Provides that, notwithstanding any agreement to the contrary, compensation for standing crops, for labour expended and manure applied since last crop was taken, and for unexhausted improvements made with landlord's consent, shall be paid by landlords to out-going tenants of allotments and cottage gardens.

**Weighing Cattle.**—To amend the law with respect to weighing cattle in markets and fairs.—The market authority of any fair or market at which cattle are sold, unless specially exempted, is to weigh cattle on sale whenever required to do so, and is to provide suitable buildings, weighing machines, etc., for the purpose.

**Shipping.**—To amend the provisions of the Merchant Shipping (Fishing Boats) Acts.—Defines "register tonnage" as "gross tonnage" for certain purposes. Extends to skippers of fishing vessels certain provisions of Merchant Shipping (Fishing Boats) Act, 1883, concerning wages and discharge, discipline, and summary settlement of disputes. Compels owners to render detailed accounts to skippers and crews in certain cases. Requires every trawler of 25 tons register and upwards to have on board a certificated second hand. Authorises Board of Trade to make regulations, subject to approval of Parliament, as to conveyance of fish from trawlers to collecting vessels; to prescribe fees payable on engagement or discharge of fishing crews, and to inquire into casualties.

## EXPLOSIONS IN GASES.

At the last meeting of the Literary and Philosophical Society, Newcastle, Professor H. B. Dixon, M.A., of Manchester, lectured on the subject "The Nature of Explosions in Gases." Professor Bedson presided, and there was a good attendance.—Professor Dixon said it was laid down by Bunsen that an explosion of hydrogen and oxygen, the most rapid known, occurred at the rate of 40 yards a second, and that, in most other gases—carbonic oxide and oxygen, marsh gas and oxygen—it occurred at a little over a yard a second. He thought it would be no difficult thing, therefore, to measure accurately the velocity of explosions. He began with carbonic oxide and oxygen, because he wished to test at the same time a theory he had formed on the mode of the propagation of explosions in these gases. He had found that absolutely dry carbonic oxide and oxygen would not explode at all; and, at the same time, that if one could put in small quantities of water, and then measure the rate, adding water and again measuring the rate, one would be able to tell whether really the water entered into the chemical reaction, for one would get in that case a greatly increasing velocity of the explosion. He put up an apparatus, consisting of a tube about 60 feet long, having attached to each end a glass tube. The two ends were brought together, one over the other; and he intended to photograph on a moving plate the flash of light as it occurred. The flash at one end of the tube would occur before the flash at the other end, and he thought that, with a slowly revolving plate, he could get two images on the sensitive paper, and thus be able to measure the velocity. He failed entirely, because the glass tubes were always fractured. But he discovered that the rate of the explosion of carbonic oxide and oxygen had been immensely underrated; he felt quite sure that it went some hundreds of times faster than Bunsen had stated, for the interval between the flashes was not more than about a tenth or an eighth of a second. He found, also, that the rate of the explosion of hydrogen and oxygen was a little over 1,000 yards a second—something vastly greater than had been stated. He had continued these experiments ever since, and proposed to give them some account of his work. His first experiment was with a mixture of coal-gas and air. He had a glass tube, put into an iron stand, and passed through the tube a mixture of coal-gas and air, having a stopcock to regulate the supply of air, in order to get an explosive mixture. First of all, he turned on the gas full, and then gradually reduced it, in order to form an explosive mixture. He wished, he said, to draw their attention to the fact that the flame gradually altered as the explosive point was neared; and then, as they got close to it, the flame altered in size and in colour, and sometimes passed down the tube with a regular, uniform motion, and then exploded. Sometimes the flame ran back to the top of the tube, sometimes it detonated at the bottom, and sometimes it hesitated, going backwards and forwards. Why this hesitation? It was very often accompanied by a singing noise; and it seemed to him that they had here a phenomenon precisely analogous to that which was found on what were called "singing flames." What happened? The sides of the tube cooled down the burning mixture, and made the flame go more slowly, so that the gas was thrown into a state of vibration; it went so slowly that diffusion between the burnt and unburnt gases took place, to a considerable extent. Therefore, the flame widened out, and, as it touched one side of the tube more than another, it was cooled down, and was thrown into a state of vibration. Owing to the vibrations in the flame, considerable local pressure was applied to the gas, and he thought it was owing to the pressure produced in the vibration that the detonation was set up. Allowing gas to pass through a wire mesh, he lit it, causing a flame on the top side of the mesh, showing how vibrations were caused in the flame by the irregularities in the mesh. Then, by placing a long tube over the flame, he showed how the pressure drove the flame through to the under side of the mesh. They were, he said, only too familiar in mines with the driving of flame through a wire mesh by sudden pressure. The lecturer next showed the different effects produced by different modes of firing a mixture, in two separate tubes, of carbonic oxide and air. On applying a lighted taper to the first, a blue flame burnt down the tube with a uniform motion; and, on passing an electric spark into the second tube, the mixture exploded with a loud report. In conclusion, Professor Dixon dealt exhaustively with Berthelot's theory that the explosive rate of gas was determined by the molecular rate. He had fixed round the room some 90 feet of lead piping, and this he filled with a mixture of hydrogen and oxygen. In order to register the rate of the explosion, he displayed an apparatus, on which were two electro magnets, each connected through a battery with one end of the leaden tube, and each having an ordinary door key attached to it. When the gas was fired at one end of the tube, it broke the current, allowing the first magnet to fall; and when the explosion reached the other end of the tube, the second current was broken, liberating the second key, and the interval between the falling of the keys thus gave the time occupied by the travelling of the explosion through the tube. He was inclined, he said, to accept Berthelot's molecular theory, with this modification; he believed that the velocity of the explosion depended not only on the steam molecules—the products of combustion—but also on the unburnt gases forming the unburnt layer in front. The lecture was profusely illustrated by means of experiments, and was listened to with great attention and interest.

## THE SALE OF DANISH MIXTURE.

At the Coventry Police Court, last week—before the Mayor (Alderman Tomson), Aldermen Soden, Maycock, and Hill, and Mr. H. Soden—Vernon Stokes, of Wolverhampton, carrying on business in Coventry under the style of the Danish Butter Company, was summoned for selling adulterated butter.—The Town Clerk (Mr. Browett), who prosecuted, stated that on the 14th December the Inspector of Nuisances visited defendant's shop, and asked for a pound of butter. The shopman inquired the price, and on the inspector pointing to a tub marked 10d., and labelled "Sweet as a rose," he explained that that was Danish mixture. The inspector took a pound of this, which, on being submitted to analysis, was found to contain 90 per cent. fat and 10 per cent. butter. It was simply what was known as "margarine." The Town Clerk spoke of the probable effect the Margarine Act, which came into force last week, would have upon retailers of mixed articles. He was told that the defendant already sold his butter as margarine; if he had been candid he would have previously sold his butter as margarine or butterine. It was perfectly obvious that the public were intended to understand that the Danish mixture, which could not mean anything in a butter-shop but Danish butter, was a mixture or a blend of butter. Here was the defendant who brought this butter from the manufacturer, and between them they succeeded in palming the article off

on the public as butter, the manufacturer getting the best fat at 2d. per pound.—Mr. Masser, who defended, thought it scandalous to make such statements unless they could be proved.—The Town Clerk said he could prove that. Proceeding, he said animal fat required manipulation to reduce it to the consistency of butter, and still further manipulation to give it an appearance of butter. The "butter" was then packed in butter tubs to impart a flavour, and on coming into defendant's shop the wood was stripped off and the contents labelled "Sweet as a rose."—Mr. Masser raised a technical objection to the city analyst's certificate, on the ground that he had failed to insert the weight of the article submitted to him for analysis, as required by the Act.—The Bench overruled the objection, and witnesses for the defence stated that the inspector, before being sold the article, was plainly told that it was not pure butter, but a mixture.—The defendant said the mixture consisted of pure beef fat and butter. It came from Denmark and Holland. It came to him through Messrs. Jackson and Darby, of Birmingham, who described themselves as provision merchants, and he paid 8½d. a pound for it, retailing it at 10d. It was known in the trade as butterine.—Mr. Masser having spoken for the defence, the magistrates retired, and on returning a quarter of an hour afterwards said they found the defendant guilty of an intention to deceive the public, and imposed a fine of 20s. and costs.—On application of Mr. Masser, the Bench consented to grant a case when desired.

## THE GOLD DISCOVERIES IN NORTH WALES.

ON Friday, the 6th inst., at the meeting of the Geologists' Association, held at the University College Gower-street, the subject of the "Occurrence of gold in North Wales," a matter concerning which diverse opinions have been expressed in *The Times*, was discussed from various points of view before a large and interested meeting on a paper by Mr. T. A. Readwin, F.G.S. The reader of the paper presented auriferous quartz from the North Wales district in the valley of the river Mawddach and Mount Morgan, in the upper part of that beautiful valley, near Dolgelly. Maps of the district also illustrated the paper.

Mr. Rudler, the president, in introducing Mr. Readwin, stated that at the last meeting of the association the subject of the reported occurrence of gold in North Wales excited attention, and it was resolved to ask Mr. Readwin, whose name had for many years been associated with the subject of geology in Wales, to deal with the subject, particularly from a scientific rather than a commercial point of view, and that gentleman had come to give information upon the subject, to which he had given absorbing attention for so long a period. (Cheers.)

Mr. Readwin commenced his paper by reminding his audience that the occurrence of gold in Wales had been known as a fact to geologists for nearly half a century, and it was quite certain, too, that the well-to-do of the ancient Britons indulged rather extravagantly in gold ornaments in torques, or neck chains, made of thick gold wire, curiously twisted; also wreaths, armlets, leglets, and signet-rings of gold. They also used golden corselets, shields, weapons, and spurs; luxuriated in the possession of "golden harps, with golden wires;" and pledged one another in bull-horn drinking cups, tipped with solid gold. A celebrated triad made three Welsh chieftains the enviable possessors of golden cars, and Meyrick, the historian, not unreasonably inferred from this that gold mines were wrought somehow by the Cymri at a very early period. It must be said that the style of the golden weapons, torques, and the like that had been found at various times were very simple, and quite unlike the style of ornamentation of the early Christian period, and it was therefore probable that they belonged to a time long anterior to that. That the ornaments mentioned were made of Welsh gold went almost without saying, and he referrnd to one of them, which seemed to have received but scanty attention—the gold corselet (or breast-plate) to be seen among the antiquities of the British Museum, which was found in Flintshire in 1830, and described and illustrated in *Archæologia* in 1835. It was thought by some that Julius Cæsar invaded these islands more for the acquisition of supposed riches than the conquest of a barbarous people. This thought might have originated in an expression put into the mouth of Galgacus, while attacking the Caledonians—namely, "Britain produces gold, silver, and other metals, the booty of victory." It was more than probable that the Romans actually discovered gold in Wales on their own account, and wrought it too; for, independently of the statement of Tacitus, just quoted, there were evidences in plenty of Roman mineworks, where gold must have been the principal, if not the sole, object of their search. One of the most remarkable was Gogofau, near Pumpsant, in Carmarthenshire. This gold mine was situated on the banks of the Cothy. Here a quartz lode had been worked "opened to the day," and a level driven nearly 200ft. through slate rock. The officers of the Geological Survey discovered gold here, and also what might fairly be called a metallurgical workshop; among the things found at the time was a beautiful gold necklace. But it might be well to notice that between the years 1631 and 1645 Thomas Bushell rented Royal Mines of King Charles I., both in Merionethshire and Cardiganshire, those in Merioneth being described as "situate near Barmouth," a fact of some significance in the present Welsh gold inquiry. The unfortunate Charles appears to have been nearly always afflicted by chronic impecuniosity, a disorder attended by many and varied inconveniences, particularly to a rather quarrelsome and very unpopular king. At one time, it was said, Charles's exigencies were so extreme that his Queen had to dispose of her silver toilet service in order to supply immediate food for the Royal household. In 1636 Bushell was allowed by the king to erect a mine at the castle of Aberystwith, ostensibly for the purpose of coining his Cardiganshire silver for the convenience of paying miners and other workpeople of his own. He struck coin of the value of halfpenny, penny, two, three, four, six, and twelve pence, and a half-crown. (Illustrations of these coins were exhibited.) It was a fact unquestioned that Bushell gave and lent his Royal master altogether treasure equivalent to quite two millions of our money. It was also a fact that the king could not have stood the racket of the Great Rebellion without the pecuniary aid afforded by Thomas Bushell. It was also a fact that Cromwell had closed the Mint at the Tower against the King, and rendered it impossible for him to get monetary supplies from that quarter. It was also certain that Bushell could not have imported gold into Wales where he resided mostly, for he was hemmed in by the Parliamentary forces, and Royal escorts were continually robbed by them. The reader said his firm impression was that this very astute gentleman, Bushell, paid more attention to gold coinage than to the coinage of silver, of which he only accounted for about £13,000 worth, and the audience were shown a £3 piece of the First Charles in gold, coined by Bushell at the Welsh mine, with the Welsh plume in place of the *fleur-de-lis*, and said that without doubt this had been got from the beautiful valley of the Mawddach. Bushell paid his royal master one-tenth royalty, and lent him the remaining nine-tenths; and it was not at all the interest of King or subject to mention the matter. The reader remarked, in pressing the point that Charles I.'s gold came from this part of Merionethshire, that Lord Bacon's new plan of mining was by driving deep levels for drainage. Bushell was his devoted pupil and the first man who ever attempted to carry out the Baconian grand and novel design. This led to the opinion that some of the Welsh excavations attributed to the Romans (those having levels) in all probability were the work of Thomas Bushell and his friends at the times when everybody was allowed by law to dig for gold and silver wherever they thought to find it. Coming nearer still to our own time, he remarked that the late Mr. Arthur Dean read "A notice respecting the discovery of gold ores in Merionethshire" at a meetiug of the British Association in 1844. Five or six years later the reader's own attention was first drawn to the subject through the invitation of a gentleman in the City to look at some native gold that had just come up, as he said, from a place in Wales, somewhere near Dolgelly. He was shown an ordinary medicine bottle marked off in the usual six doses and nearly full of water-worn gold grains and scales, a portion of which, however, he should now recognise as angular gold separated from crushed galena or blende. Sixty or more pounds were required for the six doses, which were "taken" by "Bult, in Cheapside." The man who had brought this bottled gold had walked all the way from Dolgelly—some 250 miles, and had done the same with a similar golden freight yearly for several years previously. Mr. Readwin then reviewed the literature of the subject in which the attention of geologists and miners had been given to the gold-bearing quartz of this particular district, some of the authors being Mr. John Calvert, Professor Ansted, F.R.S., Professor Ramsay, F.R.S., Mr. Robert Hunt, the speaker's own articles (at the British Association meetings and else-

where), and others; and later, Sir Roderick Murchison, Mr. John Arthur Phillips, and Professor W. W. Smyth. In order to obtain an intelligent description of this most interesting region Mr. Readwin said he employed an artist to sketch a panoramic view from the top of the Cader Idris, which dominates the district on that side the Mawddach, and upon this Professor Ramsay, then director of the Geological Survey of England and Wales thirty years ago, wrote a description. The goldfield of North Wales commanding special attention was the mountainous district of Merionethshire, having an area of fifty or more square miles, and for the most part well-known to tourists on account of its picturesque scenery. As to the mode of occurrence of gold generally, he had the highest possible opinion—namely, that of Sir Roger Murchison, who was for a long time the Director-General of the Geological Survey of Great Britain and Ireland. There were hundreds of quartz lodes in this district of all widths up to 66ft., cropping out at the surface, and all of them auriferous. Yet, he said, the district geologically was a "perfect puzzle," and he gave the technical descriptions of the various geological formations he had found. He fearlessly asserted that the numerous quartz lodes of the Merioneth goldfield were generally auriferous, and his confidence was based upon the fact that he had made, or superintended the making of, 1,000 assay operations of the mixed minerals of this valley. He had made over a thousand trials for gold especially, and only fourteen gave gold *nil*. He gave the results at length of the assays, some giving under 5dwt. of gold to the ton of quartz, while one assayer (Mr. Claudet, assayer to the Bank of England) extracted at the rate of 5·225oz. of gold to the ton from a sample of blende and quartz weighing 4oz.—this in 1884. Other rich examples as well as poor examples, were given. He said that some of the specimens before him, containing gold very heavily, were from the Gwynfynydd mine, and of his own knowledge there were half a hundred places in the district where he could go and find gold visible to the naked eye. He mentioned twenty-two Welsh names of mines in which gold had been found, and said that five of these mines only had been tested on what might be called a working scale, and from these 12,137 tons had been obtained, which yielded to owners 14,667 ounces of gold. Average, 1¼oz. to the ton of mineral. In conclusion he said: "Allow me to express my great regret that the public have got into such a state of unrest about Welsh gold, and that so much rubbish has got into the newspapers thereupon. Of course, some people are more sagacious than others, and can see through a mountain as easy as spiritualists do, and can study a difficult district right well in a couple of hours or thereabouts, and report accordingly. But notwithstanding recent exaggerations as to the gold at Gwynfynydd, there certainly exists plenty of it; and I believe that Old Yigra and Clogau, the Prince of Wales, Cefn coch, Berkllwydd, Cefndenddwr, and other mines are destined in the near future to yield on large quantities nearly an ounce of gold to the ton of mineral.

Mr. Readwin having resumed his seat amid cheers, the President commented upon the historical, statistical, and geological matters set out in this interesting paper, and said it would be unnecessary to ask the meeting to give their thanks to Mr. Readwin, for they had done so already.

Mr. Hyde Clark and Mr. Hicks having spoken upon the great value, interest, and exhaustive character of the paper, the proceedings closed with a vote of thanks to Mr. Readwin.

## FRAUDULENT TRADING IN RUSSIA.

THE Swiss Consul at Moscow draws attention in a report to his Government to the prevalence of fraudulent trading in Russia, with the aid and connivance of the agents of foreign mercantile houses. The practice of sending false reports of the state of the markets, the demand for certain articles, and the condition of trade at particular places with a view to having consignments made, which are sold at ruinous prices, is, he says, well known. But it is not so generally understood that frequently the agents sell their foreign principals' goods on credit, sending to the latter the purchasers' bills. When the latter mature, the drawer is absent, they are protested, and as no payment follows, they are handed to a lawyer for collection, the agent making a charge of 10 per cent. or more for this. It then turns out that the customer is only a name, which probably resembles that of some firm of good repute, and that he has no fixed *office* or residence. In all probability he has lent his name to the agent and is paid for doing so. To pursue the matter further than this would be simply throwing good money after bad; the result would be very doubtful, as the goods usually disappear, leaving no trace behind them. The Consul states that he would find considerable difficulty in certain circumstances in recommending honest agents in Moscow; not that there are none such, but that reputable men confine themselves to special lines of business, and would not undertake other work without clearly seeing profit in it. The others are unknown in respectable commercial circles, and will undertake any business whatever its nature may be, and whether it is sure to result in a loss to the principal or not. Hence merchants purposing to deal with agents in Moscow (and probably the same warning would apply to the whole of Russia) cannot be too cautious in parting with their goods. It may be remembered that a fraud similar to that described here was recently exposed in *The Times*, the swindlers in this case writing from Cairo, obtaining goods in India and China on credit, and drawing bills on parties in London who, when the latter matured, were nowhere to be found, and left no trace behind them except a name on a door in a street in the City.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND CO.

EXPERT EVIDENCE.—*continued.*

Mr. John Pattinson, sworn. Examined by Mr. Chadwyck Healey:—

You are a Fellow of the Chemical Society and Public Analyst for Newcastle-on-Tyne?—I am.

And you have had, I believe, thirty years' experience as an analytical chemist?—Yes.

You have been engaged on large chemical works on the Tyne?—Yes, previous to that.

In what capacity?—As chemist to the works.

I believe you have been in Court during the whole of the time that this case has been heard?—I have.

And you have heard what has been said about the production of Weldon mud and about what is called the Weldon process?—Yes, I have.

Are you yourself practically conversant with the Weldon process?—No, I am not. It has never been carried out in works where I have been present—that is when I was working in the works.

It was at that time, I believe, not invented?—No.

But have you made yourself acquainted with it since?—Yes, I have.

Then do you agree with what the witnesses have said about the production of Weldon mud in the manner in which it has been produced?—I quite agree; yes.

And do you also agree with what has been stated as to the constitution or composition of Weldon mud?—I do.

Perhaps I had better put it a little more specifically to you. What do you say Weldon mud consists of?—It consists especially of peroxide of manganese, and that is mixed—perhaps combined in some way, but mixed at any rate with lime, protoxide of manganese, and water.

In what form is the peroxide?—Allow me to add, and some of the chloride of calcium which is formed in the in the operation.

In the operation of preparing the chlorine?—In preparing the mud.

In what form is peroxide of manganese present, is it hydrate or anhydrous?—The hydrated form.

I believe you have had special experience of manganese compounds and ores, have you not?—Yes, I have. I have undertaken several researches for the purpose of endeavouring to get down the whole of the manganese as entirely peroxide, for the purpose of making an analytical process for determining the manganese in ores and other substances.

Now have you read the specification filed under Messrs. Spence's patent, and made yourself acquainted with it fully?—I have.

Have you got a copy before you?—Yes.

Now in the first place do you agree as to what has been said as to the sufficiency of the specification?—Yes, I do.

And as to the novelty of the invention there described?—Yes.

Then you will remember the expression,—I think it is in line 18 of Spence's specification—that the Weldon mud should be fully oxidised by modes well known?—Yes.

What do you understand by that expression?—Either adding a sufficient amount of lime, and applying it as in the Weldon process, so as to convert practically the whole of the protoxide of manganese into peroxide; or oxidising with a solution of bleaching powder.

Were those means well known in 1882?—Yes.

Have you practically experimented according to the directions laid down in the specification?—I have.

Now I will ask you to tell my Lord, with as much care as you can, what you have done in that respect. Have you made many experiments?—I have made a great many experiments.

Now, what was the first experiment?—The first experiment that I will mention is one with native Caucasian manganese ore, containing 88¾ per cent. of peroxide of manganese, or $Mn O_2$, and chiefly existing in the anhydrous condition.

Did you analyse that ore before you used it?—It was. This ore had been digested with dilute sulphuric acid.

For what purpose?—The removing of any carbonate of lime it might contain, or any oxide of iron. It was then dried at 212° Fahrenheit.

The point of boiling water?—Yes.

That temperature would have no effect, I presume?—Upon the combined water, No. Using that ore in the proportion as mentioned in the specification, I removed 42·86 of iron from the alum solution.

Of the original amount of iron, I presume, contained in the solution?—That is so. I may state at once that the alum solution contained 0·35 per cent. of iron.

Then what was the quantity—I do not know whether you have worked it out—of iron left in the solution after treatment?—It was about one 10,000th per cent.

I need not ask whether you consider that a very minute quantity?—A very minute quantity.

Mr. Justice Kekewich: One moment. When you used the words, "very minute quantity," I want to know whether you had in your mind the language of Spence's specification or not?—In making this experiment?

You used the words in answer to Mr. Healey "a very minute quantity?"—Of iron left.

Mr. Justice Kekewich: That will do. I see it is quite obvious you were not referring to the specification.

Mr. Chadwyck Healey: I think I used the words very minute portion. I said "I need scarcely ask whether you consider that a very minute quantity."

Mr. Justice Kekewich: I only wanted to see where his mind was.

Was that the whole of the experiment, Mr. Pattinson?—That was the whole of the experiment.

What was the next experiment you tried—but I should ask you first as to Caucassian ore. Is it a common ore of commerce?—Yes, it is.

And I think you said it was chiefly anhydrous peroxide? Yes, using larger quantities of that ore. Before leaving that, I would mention that I have removed 99·54 of the iron.

Using a larger proportion of the mineral than is specified? Yes.

What proportion did you use in fact?—222 parts per 100 parts of the dry alum cake. I did not try the intermediate proportions.

You did not try the intermediate proportions you say?—No.

Can you speculate at all as to what the result would have been if you had treated with the intermediate proportions? Would there have been any ratio of the iron extracted?—I would expect the more manganese you used and the more finely titrated it was, the more iron would be separated.

The ore which you used, in what mechanical condition was it when you added it to the solution of alumina?—It was finely pounded in an agate mortar, still its physical condition was very hard and compact.

By relation to Weldon mud, what was its condition—coarser or finer?—Very much coarser. Substances which are precipitated are necessarily infinitely finer than anything which can be done by pestle and mortar.

When you ground the substance under pestle and mortar, did you levigate it?—Yes.

What was the next experiment you tried?—The next experiment that I shall mention is one with Tennant's artificial peroxide of manganese, which has been referred to here as Dunlop's manganese.

I was going to ask that. Tennant's is the same as Dunlop's?—Yes,

Now, how did you use that. First of all what form of peroxide is that?—Anhydrous.

Did you prepare the peroxide yourself then?—Not originally. I obtained some of Tennant's peroxide, and treated it with nitric acid to remove the lime and any iron that it might contain or other substances, and then dried it and heated it to a dull redness.

Which would be equivalent to a temperature of what?—Oh, about 1,000° Fahrenheit. That would entirely remove all water.

All the water in combination?—Yes, all the water of every kind; and by analysis I found that all the water had been removed.

Have you any doubt that that was anhydrous peroxide?—None whatever.

Now, what did you do with it, having satisfied your mind as to that?—I added various proportions of this peroxide to alum solution; but in this case I did not use exactly the proportions mentioned in the specifications—6 per cent. In one experiment I used 5 parts of the peroxide.

To the 100 parts of alumina cake?—To the 100 parts of dry alumina cake, and that removed 81·43 per cent. of the iron.

What was the proportion of iron contained in the alum solution, do you know, originally?—It was ·035.

It was the same, was it?—Yes. You may take it I used the same alum solution throughout the whole of the experiments.

And you extracted what?—81·43, using 5 parts of the manganese compound. I then used 10 parts of the same manganese compound, and I removed 97 per cent. Then I used 15 parts of the manganese compound to 100 parts of dry alum cake, and removed 99·37 of the iron. I then used 20 parts of the same oxide of manganese with the same quantity of alum solution, and I removed 99·8 per cent.

There was not very much left then?—No, a mere trace of iron.

Then before we go to any further experiments, may I ask you if you have any doubt whether anhydrous peroxide of manganese will effect the purpose stated in the specification? I have no doubt.

Now, what was the next experiment that you tried, Mr. Pattinson?—The next experiment was with the oxidised Weldon mud, and I used that in the proportions mentioned in the specification,

First of all—may I proceed by steps—you procured the common Weldon mud, or did you prepare it?—I procured the common Weldon mud and prepared it.

From the factory?—Yes.

And then did you fully oxidise it by the method described in the specification?—Yes, I did.

What method of oxidisation did you use?—I used a solution of bleaching powder.

With air, or the solution of bleaching powder only?—The solution of bleaching powder only.

What proportions of the material so prepared did you use?—Six per cent of the dry $Mn O_2$ to 100 parts of the dry alum cake.

In that condition the peroxide was hydrated I think you have already told us?—Yes.

What result did you obtain from that?—In one experiment I obtained this result: a removal of 97·57 of the iron. Then, taking some of the mud manganese material, I dried it at 212°, and tried it in that condition as well, and removed 93·47 per cent. of iron. Another experiment which I made was using the same material, but having previously digested it with nitric acid, to remove the lime, and any protoxide that there might be left in it.

In the first experiment which you made with the Weldon mud I infer that you did not treat it with nitric acid?—I did not then, but now I treat some with nitric acid to remove the lime.

And, I suppose, any other accidental impurities, such as magnesia?—Yes; and that removed 95 per cent. of iron from the alum solutions.

Well, what next?—Another part of the same manganese as last used I heated to 540° F. to remove the water.

This is a new departure with your experiments?—It is all with the oxidised Weldon mud differently prepared, first, by the simple oxidisation of the Weldon mud, and secondly by removing the lime with nitric acid.

But still hydrated?—Still hydrated; and now I am going to describe the result of trying it with heated purified manganese as I call it.

Hydrated peroxide is what you have been dealing with?—Yes, having been previously treated with nitric acid, I heated

that hydrated peroxide to 540° F. to remove the water, and in that condition it contained 83·12 of $MnO_2$.

Is that an anhydrous peroxide?—Yes, sir.

So 83·12 is an anhydrous peroxide?—Yes, treating that with the alum solution in the same proportions as in the specification, 96 per cent. of the iron was removed. I may mention here also that I used Weldon mud as obtained direct from the manufacturer, and used in the same proportions as specified.

You mean after fully oxidising it?—After fully oxidising it.

Without any treatment at all?—Without any treatment, as it leaves the manufacturer, and that removed 96·92 per cent. of iron. Another experiment, with the oxidised Weldon mud in this case, removed the same amount, 96·92 of iron.

May I take it wherever you oxidise the Weldon mud you always use the same process, to save repeating the question? Yes, that is so. Then I took the oxidised Weldon mud, digested it with carbonate of soda, to remove any sulphate of lime it might contain, and with nitric acid to remove any lime it might contain, and the resulting product contained 87·39 of $MnO_2$.

Is that anhydrous or hydrated?—Hydrated. That removed 94·36 per cent. of the iron. Then I oxidised the Weldon mud, purified as just described, and heated it to a dull redness to remove the water—the whole of the water,—and in that condition it contained 58·55 of $MnO_2$, because in driving off the water some of the oxygen of the peroxide was also expelled.

Mr. Justice Kekewich: Expelled do you say?—Yes, expelled. In using that in the same proportions as the others, 92·31 per cent. of the iron was removed.

Mr. Chadwyck Healey: Are those all the experiments you made?—No, there are others, I have also attempted to make pure $MnO_2$, but it is an exceedingly difficult thing to make it absolutely pure.

That is, absolutely pure anhydrous peroxide of manganese? Meaning anhydrous peroxide of manganese. I only know of one method of producing a peroxide of manganese which is absolutely and entirely $MnO_2$, and that is Gorgeu's method, already mentioned. It is formed by decomposing nitrate of manganese. Some of this which I prepared myself I dried, and knowing its very hard physical condition, and how very slightly it would act upon any solution, I endeavoured to get it as fine as possible, and that I attempted to do by grinding it well in an agate mortar and floating off the finer parts with water, so as to get it in a fine state of division.

You say you know how difficult it would be to get it to act if so hard. Would you have that knowledge in 1882?—Yes, certainly.

Would you kindly resume your description of what you did?—With that manganese—$Mn_3O_4$—by-the-bye I may as well mention here that I analysed it, and found that it contained 98½ per cent. of $MnO_2$—the whole of the manganese being in that condition. It contained also 1·1 per cent. of water, and ·44 of other matters and loss, making altogether the 100 parts.

Yes, and having obtained that peroxide, what then?—Having obtained that peroxide, I experimented with it, using the proportions mentioned in the specification. The first experiment I had I removed 11·43 per cent. of the iron. In another experiment with the same proportions, in which I attempted to get the manganese still finer, and digested it for longer time, I removed 28·57 of the iron, using the same proportions. Then taking the Gorgeu's manganese, with which I made the first-named experiment, and by which there was only 11·43 per cent. of iron removed, I used it in larger proportions. I used 24 parts, instead of 6, of the $MnO_2$, and that removed 40 per cent. of the iron. I experimented further with larger quantities of the same material, and I used in this case 295 parts of the $MnO_2$ to the 100 parts of the alum cake, and that removed 96·6 per cent. of the iron.

Have you now completed your list of experiments?—No, I have still some further experiments, but they are merely confirmations of the other experiments, and I will not trouble the Court with them at present.

Are you able to attribute the difference of results which you have obtained by the use of the natural mineral, the Weldon mud, and the last substance you named, the reformed peroxide, in particular cases, to any special cause? Have you formed any idea as to the cause of the difference? I attribute it entirely to the physical condition of the material used. In the case of the Gorgeu manganese, and in the case of the native manganese ore, it was the hardest material, and those only removed up to 42·86 per cent.; then Tennant's manganese comes next in its hardness, which removed up to to 80 per cent.; then comes the Weldon mud in all its various forms, and you will observe that there is a gradual increase in the amount of iron removed after those materials are used which have been precipitated or are in a finer physical condition; precipitated $MnO_2$ acting most readily; next less readily the $MnO_2$ of Tennant's peroxide; next the native manganese ore; and last of all Gorgeu's artificial manganese peroxide.

You attribute it then to the physical condition of the material you use?—Yes.

I suppose that it is not an uncommon thing in chemical technology?—It is quite well known.

May I remind you of perhaps an illustration? Take the case of graphite and charcoal for the purpose of purifying liquids—charcoal is in a different physical condition to graphite, although it has identically the same chemical condition, but one works better than the other?—Yes, exactly as in this case.

The analogy is complete?—It is complete, sir.

Now, will you turn to the claim in Spence's specification; you have heard many questions asked about the claim since the case began. They claim "the use of manganese combined with oxygen as peroxide, whether produced from lower oxides by oxidisation or from manganic acid or permanganic acid, or their salts, by deoxidisation." Do you agree with what the other witnesses have said about the possibility of obtaining the peroxide from both of those acids?—I do.

If you have a salt of manganic acid you add some other acid to it for the purpose of dissociating it from its base. I do not know whether I am using accurate language—but you get, I believe, the peroxide of manganese as the result?—Yes, and permanganic acid.

Now, from what source did that peroxide of manganese come. Are you able to say?—It would come from the original manganate, no doubt.

When the acid is added to the solution of the salt is it or is it not the fact that manganic acid is immediately liberated. Are you able to say?—Well, it is immediately decomposed if it is.

It immediately decomposes, and forms the peroxide of manganese?—Yes.

Was that well known in 1882?—Yes.

And can you, taking the peroxide of manganese in combination with a base in the same way, prepare peroxide of manganese?—Yes, but not in the same way exactly.

In a similar way, in a way at all events known in 1882?—I would use the method mentioned by Dr. Hurter yesterday.

Which he said was known in 1882. Do you agree to that? I do.

Does manganic acid or permanganic acid exist as an article of commerce?—No.

Then, if you want to have either of those acids, you must prepare it from some salt or other?—Yes, from the manganates or permanganates.

Then, in preparing peroxide of manganese from any substance, I will not say according to directions, but according to the suggestions of the specification, would the oxide be in the hydrated or the anhydrous form?—It might be either.

If it were in the hydrated form, in your opinion, would the manufacturer take any further steps with it before he used it? Would he desire to convert it into the anhydrous form?—No, certainly not—not for this purpose.

Mr. Moulton: I do not admit, my lord, that that is a proper question.

Mr. Chadwyck Healey: Have you any other experiments to which you would like to refer before I sit down?—I do not remember any.

Have you read the specification filed in Kynaston's patent? Yes, I have.

And do you agree with what has been said by the other witnesses as to that?—I do.

CROSS-EXAMINED BY MR. MOULTON.

Now, Mr. Pattinson, let me ask you one question about your experiments. Will you kindly exclude for the purpose of my present questions any experiment in which the substance used with the aluminous solution contained either hydrated peroxide or one of the intermediate oxides of manganese—you know what I mean?—Yes.

Just exclude those, and now tell me in which experiment neither of those bodies were present?—The only one is Gorgeu's manganese, or rather the three or four experiments with that manganese which I have mentioned.

Now, just tell me what was the proportion of iron in the aluminous solution?—It was ·035, or about ·89 in the dry alum cake—·035 in the alum solution.

And if I understand rightly when you had reduced it in order to take the iron, how many parts did you use?—In which experiment?

I thought you said there was one experiment in which you took out a large portion of the iron, was there not? With Gorgeu's manganese?

Yes?—Yes, I took out 93·06 of iron when I used 295 parts. I took out 28·57 when I used six parts.

Now I think, Mr. Pattinson, you will admit that from a practical commercial point of view such an enormous amount as 295 parts would be quite useless?—Yes, that is too much to use practically.

It would make the whole thing useless?—Yes.

And further, the amount that you removed with the proportions shown in the specification would be too small to effect the purpose properly?—It does not remove it all.

Not even a third of it?—No, not quite a third, but you remember that in the experiment in which 40 per cent. was removed 24 parts were used, and in that case I would not be prepared to say that that would be an impracticable quantity to use.

That would be an impracticable quantity?—No, I do not think so.

Tell me how much you used?—Twenty-four parts.

And how much did you remove?—Forty per cent.

That is to say, you used four times as much as stated in the specification, and then you only removed two-fifths of the iron?—Yes.

And that was in a solution in which there was only ·09 of iron in the dry alum cake?—Yes, that is so.

I put it to you that in ordinary a fair proportion of iron in the dry alum cake would be five times that?—In other kinds of alum cake?

I mean that in a fair sample of ordinary alum cake the fair proportion of iron would be five times that?—Yes, I think so.

Now you have told his Lordship how you made this, that you called Gorgeu's manganese; but, Mr. Pattinson, it is not a very unusual operation in chemistry, is it, to produce oxidisation?—Not at all.

Oxidisation is an operation, a chemical operation, which you very frequently have to do; is it not so?—But it is a very unusual thing to find any means of thoroughly oxidising peroxide of manganese.

Now I will take another oxide of manganese or any of the lower oxides below Mn $O_2$, which may be mixed with the peroxide very frequently, may it not?—Yes, it generally is.

Now I suggest to you that a common way of oxidising would be, to pour concentrated nitric acid upon that, and heat it until you drove off the nitrous fumes. That would oxidise fully, would it not?—I should think so; very likely.

That would not be a difficult experiment to perform, would it?—No.

And you agree with me that oxidising with strong nitric acid is a very common mode of oxidising?—Yes, it is; but I may say here that I made my Gorgeu's manganese exactly in that way. I first of all obtained crystallised sulphate of manganese, and precipitated that as a carbonate; and I then took the carbonate and dissolved it up with nitric acid, and there I have the treatment with nitric acid.

I will take that; you took the peroxide and put nitric acid on it and heated it to drive off the nitrous acid?—Yes.

Do you suggest that that always produces it in an exceedingly hard crystalline substance?—Yes, prepared in that way.

Are you sure of that?—Yes.

Supposing you only heated sufficiently to drive off the nitrous acid, have you not tried whether that does not make it in a very manageable form?—I have made two quantities of it, and in both cases the product was exceedingly hard.

How high did you heat it?—To 6000.

To 6000?—I beg pardon, to 329° F.

And you say you got a very hard crystalline substance?—Yes, in very hard particles, very fine hard particles, not crystallised exactly, but cohering together considerably.

But was it not exceedingly finely divided?—No, I should not think so.

Are you prepared to say it is not?—Yes, I should say it is not finely divided.

I do not say they do not cohere, but when they are broken up is it not a very finely divided substance?—Yes.

So I thought?—But nevertheless it is in a very different condition from manganese which has been precipitated.

That may or may not be, Mr. Pattinson, but you will quite agree with the other witnesses in saying that there is not any suggestion here throughout the specification that you must turn your manganese into any special physical condition, is there?—No, excepting that you must necessarily have it in a certain physical condition if you follow out the specification as to the proportion of the manganese material which is used.

In the case of Weldon mud, you mean, it will be in one form?—In the form of precipitated peroxide of manganese.

Which will not mix with water in Weldon mud even. It will mix, but only mechanically?—Mechanically.

It will be in suspension?—That is so.

And it will be equally in suspension when you use this anhydrous oxide which you prepared?—Yes, but in which the particles of peroxide of manganese are very much closer combined.

It may or may not be, but when it is finely divided it will be in suspension also?—Yes.

Now, on comparing this experiment with the experiments in which the hydrated peroxide of manganese is used, is it not the fact that there is enormously—I will put it first in this form: Is there not an enormously greater activity in the hydrated form?—Yes, I will state that as a general fact, but I would like to call to your mind the experiment with Tennant's manganese, in which 97 per cent. of the iron was removed by ten parts Mn $O_2$ of the compound.

But you told me that was a case in which there were intermediate oxides present?—Yes, that is so.

I will come to the intermediate oxides directly. Now, Mr. Pattinson, you substantially told us that the peroxide of manganese which is produced from the nitrate, and in the anhydrous state, is practically incapable of doing this, that is of being used commercially for the purposes of this specification, is it not?—Yes, I think so.

Now to what do you attribute that?—Chiefly to its physical condition, I may say entirely to its physical condition.

Simply because you say that it is a harder body?—Yes.

That is your view?—That is my view. It does not act so readily upon any substance in solution.

Now this you told us was a finely divided body?—I put it to you, is it not as finely divided as dry hydrate peroxide of manganese would be?—No, certainly not.

You are prepared to say it is not?—Yes.

It is not as finely divided as that which I am talking about. I am simply saying finely divided?—No, it is in an entirely different physical condition.

I am talking about finely divided?—No, I do not think you can divide a compound of that kind so finely as you can one which has been precipitated.

I am not talking about pushing both of them to their utmost limits, but I say, take this compound and turn it into a powder, and you have told us that it is finely divided, and I say take the dry hydrated peroxide of manganese. Are you prepared to say that the anhydrous is not as finely divided as the hydrated?—Not so finely divided.

At all events they are both powders that will only remain in suspension in the water?—Both of those will remain in suspension.

They are not soluble in water, either of them?—No, but the particles of one class of manganese are very much more closely packed together than the other.

Mr. Aston: More what do you say?—More closely packed together and harder.

Mr. Moulton: There are other ways of oxidising, are there not, besides nitric acid? Is not chloric acid a common way? Yes.

Did you ever try oxidising—that is, completely oxidising these manganese compounds with chloric acid?—No.

You can actually precipitate anhydrous peroxide of manganese, can you not from chlorate of potash by means of nitric acid?—Yes, that is a very well known analytical process.

Have you tried that?—No, not for this purpose.

Are you prepared to say that that would not give you finely divided peroxide of manganese?—Not nearly so finely divided as precipitate.

That is a precipitate, is it not?—Yes, but not from a solution.

I am talking about a solution—a precipitate from a solution, by means of chlorate of potash added to nitrate of manganese?—I should say, from the appearance of the precipitate, you can see that it is very much denser and harder than that which has been precipitated as hydrated peroxide of manganese.

At all events it would be sent down in a powder, would it not?—Yes.

Have you tried it and seen what it is like?—Yes, I have seen that.

Now, did you take it and try whether that would throw down iron from an aluminous solution?—No, I have not, but I have very little doubt that it will.

That is a very well known way of making the anhydrous, is it not?—Yes, it is, but allow me to explain that in my opinion that does not throw down the whole of the manganese as a peroxide of manganese; there is a little protoxide mixed in it. That is the result of my experiments in endeavouring to find some method which would get down the whole of the manganese as peroxide.

Then you say it would come down as peroxide of manganese, with some of it as a protoxide?—A small quantity of it.

But the protoxide of manganese would not prevent the peroxide throwing down the iron, whatever other consequences it brought?—No; that is probably the reason why I did not think of trying that method instead of the one I did try.

In fact, I may take it that none of the impurities we have been speaking of in peroxide of manganese, always excepting iron itself, would prevent the action of peroxide of manganese on iron?—Certainly not.

Mr. Moulton: Now let me go to another group of your experiments, namely, those in which, what we have called the intermediate oxides, were present in the body there when used. First of all, as to those intermediate oxides; you agree with Dr. Hewitt in the point that these intermediate oxides were what people call manganites of manganese. I do not know whether you agree with the nomenclature or not, but that is what "manganites of manganese" means?—They have recently had that meaning, but I have always considered them as mixtures of peroxides and protoxides.

At all events "manganites of manganese" mean those things, do not they?—Yes.

It is only the meaning of the word that I wish to get. Now just tell me those of your experiments in which those were present?—I have given you the results of several.

Never mind the results; just name the experiments please.—The oxidised Weldon mud that had been heated to 545°, and the oxidised Weldon mud that had been heated to redness.

What do you call redness?—Dull redness about—about 1000°.

What thermometer?—I did not use a thermometer. I heated it to redness in a muffle.

1000° F.?—Yes.

And those are the only ones are they?—Yes, I think those are all.

I am not going to deal with any of the others, because I understand that all those had hydrated peroxide present?—Yes.

Now I will deal with these. It is common ground to my learned friends that hydrated peroxide is efficacious. First of all, with regard to this oxidised Weldon mud heated to dull redness. That of course would drive off a good deal of oxygen?—Yes.

And so with oxidised Weldon mud heated to 545°?—Yes. Allow me to explain that there was not very much protoxide formed in the last instance, because the product is 83·12—$Mn O_2$.

Take that case where you heated it to 545° and made a solution of it. Did you make any experiments to see if it did not rehydrate—whether it did not combine with water if you put water on it?—No, I did not.

You are not able to say whether it did or did not?—No. I am of opinion that it would not rehydrate; it would mix with the water, but it would not chemically combine with it.

But you did not make any experiments to try?—No, I did not. Allow me to state that I know that peroxide is very hygroscopic; it very rapidly absorbs water from the air, but it can be easily driven off again.

Now take Tennant's experiments?—I have had several experiments with Tennant's.

I am not talking about numerical results, but the processes. First of all, what was Tennant's? You haven't Tennant's carbonate of soda, I understood?—No; Tennant's peroxide of manganese.

How is that made?—It is made by precipitating the carbonate under a high pressure and then heating on trays at a temperature of 500° or 600°.

It is a well known thing that that contains a large proportion of the lower oxides, is it not?—Yes.

Then what did you do with that when you got it? Just tell me the various experiments you made?—I further heated it to redness.

That would send off some more oxygen would it not?—Yes, that would send off some more oxygen. Using the proportions in Spence's specification, the 6 per cent., I took out 80 per cent. of the iron.

That would work, we will take it?—Yes.

Now just go on and tell me the next experiment?—It was with 5 parts of Tennant's manganese.

If it is only as to difference in the results do not give it me. It does not differ in the process—all the processes were alike; that is, the manganese mineral was shaken with the alum solution. That is what I call the process through which they were put.

You misunderstand me. What I want to know is this. Ultimately you put all that into an alum solution with iron in to throw the iron down?—Yes.

What I want to know is, what you did with this Tennant's before you put this in?—Heated it to redness.

In all cases?—I have some experiments in which it was not heated to redness.

Give me those?—I have only tried three with larger quantities than those specified. I can give you one experiment.

Did it require larger quantities of it to work after it had been heated to redness or before?—Larger quantities after it been heated to redness.

To do the same work?—Yes, but of course you understand that in every case I always took the quantities specified in Spence's patent, that is, the quantity which would contain 6 per cent. of $Mn O_2$—peroxide of manganese.

You did not take 6 per cent. of your substance at all, but you estimated what you considered was the peroxide in it, and then took 6 per cent. of that?—Exactly.

How did you estimate what the peroxide was?—By a well known analytical method. I tested it in the usual way with a solution of ferrous salt. I took a measured quantity of sulphate of iron in which I knew what iron there was in the state of protoxide. I added the manganese material to it, and heated it. The result was to oxidise a certain quantity of the iron and make it a ferric salt, the amount being exactly the amount of the measure of $Mn O_2$ in the substance you are analysing.

That is what you mean by determining the amount?—Yes, that was done in every case.

You told us that you used it having heated it, and you used it without heating it. Was there any other way you used what you bought from Tennant's?—I told you that it was treated with nitric acid, so as to take out any carbonate of lime.

In all cases?—In one case I used it exactly as I obtained it. In the other cases it was always purified with nitric acid to remove carbonate of lime and then heated.

Have you ever tried any of these intermediate oxides of manganese with an iron solution?—Only in the case where it is formed in the way I have indicated.

You never isolated those and tried those on an iron solution?—No; that would be very difficult to do, because you cannot keep the protoxide of manganese so long as protoxide.

I am not talking about protoxides but intermediate oxides? They would contain protoxide. Intermediate oxides would always contain some Mn O.

But there are intermediate oxides?—You may regard them as intermediate oxides, but they are mixtures of peroxides and protoxide.

In every chemical book would not you find two well-known intermediate oxides?—They are theoretically put down so. I know they are enumerated $Mn_2 O_3$ and $Mn_3 O_4$.

You yourself in writing about manganese speak of them as intermediate oxides?—Yes.

And you always have?—Yes.

Have you ever tried those intermediate oxides and their power of throwing down iron?—Only where they are formed in the way I have indicated.

But you have never tried them separately apart from peroxide?—No.

And you have told us all the ways you have tried to make anhydrous peroxide?—Yes.

They are not all the ways that are known, are they? I will give you another one, heating the nitrate with chlorate of potash?—Yes,

Or the carbonate—heating the carbonate with chlorate of potash?—I do not know that it is well known; I do not remember it.

But there are many ways of doing it, are there not, and all you have tried is this heating of the nitrate?—Yes; I was seeking for the purest form of peroxide, and that was the only one I found in which all the manganese existed as peroxide.

Now, just one question about the claim. Apart from the salts of manganic acid and permaganic acid, you know no way of making the peroxide from the acids themselves?—No; I agree with what Dr. Hurter and Dr. Hewitt have said on that point.

There is no way of making it from the acids as contrasted with the salts of the acids?—No,

Now, further, do you agree with Dr Hurter that the oxygen combined with manganese would form peroxide? I will not put it "agree with Dr. Hurter, I will put it to you independently. Does not that mean $Mn\ O_2$?—Yes, absolutely theoretically speaking, it does, but you can very seldom get it in actual practice.

The chemical formula for hydrated peroxide is $Mn_6\ OH_2$ is it not?—Yes.

And that is a definite chemical body?—Yes.

You heard what has been said about the specification of Spence's patent in showing whether the anhydrous or the hydrated is to be used—either in the body of the specification or in the claim, and you agree with that, do you not—there is nothing to indicate which is to be used?—Nothing, except the description of how he produced it.

In the particular case it is the hydrated, is it not?—Yes.

But, excepting that he uses the phrase "oxygen combined with manganese to form peroxide," there is nothing to indicate whether it is anhydrous or hydrated?—Will you allow me to say here that all chemical manufacturers who have anything to do with manganese would understand, when peroxide of manganese is spoken of—or at least in most cases—they would understand hydrated peroxide of manganese, especially from Weldon mud.

Then Weldon mud is a different matter. When people talk of peroxide of manganese, is it not a fact that the only peroxide of manganese in the market at that time—or substantially the only peroxide of manganese in the market at that time—was the native peroxide?—Weldon mud was made very largely at that time; I do not know whether any of it was sold.

But that which was sold was the native peroxide?—Yes.

And that is substantially anhydrous, is it not.—Yes.

Therefore I put it to you; would not a person hearing that peroxide of manganese was to be used, conclude, unless there was something to lead him to another conclusion that he meant the native one?—That would be one of the forms he meant, certainly.

Now let me go on. You see that in the instance that is given it is hydrated?—Yes.

If a process of oxidation had been used for Weldon mud, which left the result an anhydrous one, that would not be so, would it?—No.

There are processes of oxidation of Weldon mud. I will give you an example: The nitric acid or the chloric acid which would yield an anhydrous one?—Yes, I suppose so.

I have only one more question to ask you, and that is this: As you read the claim in Spence's patent, is it not only the peroxide that is claimed?—Yes, without specifying whether it is hydrated. I gather that it includes all, hydrated and dehydrated.

Assuming you are right in that, there is nothing to include the other oxides, is there?—Not in the claim, I think—simply peroxide.

In the provisional or the complete specification or the claim?—Yes, only peroxide.

RE-EXAMINED BY MR. CHADWYCK HEALEY.

Is the nitrate of manganese process one which is used in commerce, or is it a laboratory process?—It is only a laboratory method.

Was the process to which my friend Mr. Moulton has referred, of making peroxide of manganese by the use of chlorate of potash a process which was used in commerce or manufacture, or was it a laboratory process?—Purely a laboratory process.

Was that the case in 1882?—I am not sure whether the last-named method was known in 1882. It was just about the time that it was known.

You are not sure whether it was known?—The one with chlorate of potash.

But at the present time it is a laboratory process only?—Yes.

And does your answer as to the nitrate of manganese process apply also to the present time?—Yes.

What was the condition of the peroxide of manganese made under Tennant's process—that which you use—by comparison with the natural peroxide?—It was in a very much finer state of division from the nature of its production. It was precipitated from the solution, therefore I should expect that it would act very much more rapidly upon the iron or alum solutions.

Mr. Watson Smith was next examined.

*(To be continued.)*

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

H. H.—Your letter on Christmas Boxes must stand over till our next.

AMMONIA.—We propose to have some articles treating on the analysis of tar products. 2. In a future number.

J. H. C.—The gas from a ton of coal will yield at least 2½ gallons of 90 per cent. benzol.

R. H.—We have not yet heard of "the impostor" in the Manchester district.

J. W.—It takes more coke than coal to fire a tar still. We may treat of this on some future occasion.

G.—We believe there is a book published on Venezuela, by James Mudie Spence. Write to our printers, Messrs. Palmer and Howe, Manchester. Pyrites are taken to Barbados even if not found in the province of Venezuela.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## MULTIPLE EVAPORATION.

*To the Editor of the Chemical Trade Journal.*

Sir,—Replying to the inquiry of "A Papermaker," I may state that by means of a multiple evaporator constructed by me for that special purpose the liquor from esparto boiling leaves the apparatus with a strength of 50° Tw., when measured in a hot state. It gets solid when cooled down to the ordinary temperature, and burns by itself in the calcining furnace; it contains about 15 per cent. of sodium carbonate. In certain cases no fuel at all is required for the evaporation; in others a saving of about half of the usual quantity of fuel is effected,—Yours truly, AN ALKALI MAKER.

## ALCOHOLIC POTASH.

*To the Editor of the Chemical Trade Journal.*

Sir,—I should like to add my testimony in support of Mr. E. W. J. Jones's statement that redistilled alcohol gives a nearly colourless solution when potash is dissolved in it. I have been accustomed to redistil alcohol, purchased from a wine and spirit merchant at one guinea per gallon, adding the residual portion of the old solution of alcoholic potash to it, and distilling over the whole gallon at the temperature of boiling water. In the distillate thus obtained I dissolve pure potash (by alcohol), 30 grammes to the litre, and obtain invariably a colourless solution, which assumes a light brown colour only after standing for several weeks.—I am, etc.,

A. E. JOHNSON.

## A CHEMICAL IMPOSTOR.

*To the Editor of the Chemical Trade Journal.*

Sir,—Will you kindly allow me to confirm your correspondent's letter of last week?

From the description, the man is the same who called upon me three months ago, and obtained a loan to help him out of his sad extremities.

He speaks German fluently, but his pronunciation is indistinct. His eyes are deep-set and half closed. He is apparently short-sighted, but when he called upon me he pleaded that his spectacles had been stolen from him. His trousers were dark grey, and striped; his jacket was light brown, long, and the back seam was closed all the way; his hat was of black felt, but very shabby.

He has evidently travelled in the neighbourhood of Edinburgh and Glasgow, and he speaks familiarly of Scotch chemists.

If, through the medium of your valuable journal, and the assistance of your readers, this impostor could be traced to his present lair, and dealt with summarily, you would help, sir, in ridding chemists throughout the country of a real pest.—I am, sir, yours, etc., Ph.D., F.I.C.

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—Your two correspondents, "Common Sense" and "Menenius," seem to look at the Institute from different standpoints, while "J. H. K." is one of those who are ready to join so soon as they can see some advantage to themselves by so doing. "A Disgusted Fellow" has a wail in another direction, so that I hope you will allow me a few words upon what this present correspondence seems to indicate. First, does it not show that the Fellows have no common interest? Some are manufacturers or proprietors of works, some are in practice as analytical chemists, and others are in subordinate positions as chemists or as paid or unpaid assistants to analysts in practice. In law and medicine these different conditions do not appear, or at least not so strongly, and consequently we have more important institutions. Now, I have never joined the Institute, as I have always held that its existence is of no use to the profession whatever, and certainly up to the present time my views have been justified. The second feature shown by the correspondence, is that the Fellows are not a united body, but an association of malcontents, a picture of the house divided against itself. One of your correspondents suggests that the Institute should endeavour to prevent anyone from practising without qualification as a Fellow; but these are days of progress, and I would caution the Institute not to attempt any such thing.—I am, yours, etc., Bon Ami.

*To the Editor of the Chemical Trade Journal.*

Sir,—As yours is about the only chemical paper where one can insert a letter upon the above subject, perhaps you will allow me to make a few suggestions. It is quite certain that the Institute of Chemistry has no attraction for country members, in fact I am so sure that the present council give preference to everything London as against the country, that I would be willing to aid in turning the present council "bag and baggage" out of office, in order to see what a new board is able to do. If we could not succeed in doing this, I would suggest the formation of another institution especially for country members, as I for one cannot understand the lassitude of the powers that be. The only good men, I mean pushing men of business, at one time on the council, have been pushed off to make room for the "dummies" of party cliques, with the effect of reducing the Institute to imbecility. How long are country members going to stand by and pay their guineas to aid in such work?—I am, etc.,

A Country Fellow.

## THE HARGREAVES THERMO-MOTOR.

*To the Editor of the Chemical Trade Journal.*

Sir,—I am at present engaged in making some important alterations in the Thermo-Engine, which I have no doubt will give even better results than those already obtained.

I hope to have it at work again in three weeks or a month hence, and if you will kindly publish this in your valuable journal it will save disappointment to those who otherwise would come to see the motor at work. Many gentlemen have come to Messrs. Adair's works during the past few days, and have naturally been disappointed to see the machine dismantled.

Your suggested improvements in the relative volumes of air pump and working cylinder have been anticipated in the plans for a new motor in course of construction. I have gone considerably in the direction you suggest, but not to the full extent.

The great bulk of the users seem to prefer compactness, rather than saving a little fuel, and their preferences have, of course, to be considered. Your "hint" as to the desirability of a little more freedom in the passages has also been anticipated. The regenerator packing used at the time of the visit of the gentlemen of your staff to Messrs. Adair's works, has been replaced by other material which allows greater freedom of passage than was shown in the diagrams then taken. The result, of course, has been increased indicated power, as you expected.

I only trust that your anticipation that "the maximum result has not been reached yet," may be as well verified when the modifications are completed.—I am, etc.,

James Hargreaves.

# Trade Notes.

The Lanoline Patent in Germany.—The recent litigation in Germany between the firm of J. D. Riedel and the Chemical Products Joint Stock Company in liquidation, now Messrs. Jaffe and Darmstädter has been concluded by the judgment given by the Reichsgerict against the plaintiff, J. D. Riedel. The outcome of the judgment is simply that any apothecary or industrial chemist who mixes pure wool fat with water becomes guilty of an offence against the Patent Law.—*Chemiker Zeitung.*

New Deposits of Oil and Sulphur.—According to reliable accounts lately received from the Northern Caucasus, the mineral and oil wealth of this range of mountains would appear to have hitherto been considerably overlooked. Pure naphtha is stated to spout from the earth spontaneously near to the mountain of Dargen-Duck. A further interesting feature connected with this mountain is a cave which is covered with heavy deposits of sulphur. Baron von Heyking, who calls attention to this matter, himself engaged in hunting pursuits, contemplates next spring taking steps to develop these resources, and states his intention of endeavouring to form a company to carry out a mining scheme in connection therewith.—*Chemiker Zeitung.*

Aluminium Alloys.—Count R. de Montgelas, of Philadelphia, has come to the front with three patents for the production of aluminium compounds. In the first, the double chloride of aluminium and sodium is fused with an excess of zinc, obtaining thereby an alloy of zinc and aluminium, which is again fused with the double chloride and magnesium. In the second process, the double chloride is fused with oxide of lead, charcoal, and a suitable fluid, with the addition of a little magesium. The third process deals with electrolysis, but the aluminium producers need not become uneasy on account of the existence of these patents.

A New Industry at Newcastle-on-Tyne.—A new industry is about to be established on the Tyne. It is a factory for the manufacture of explosives and quick-firing gun ammunition. The projectors are Messrs. Armstrong, Mitchell, and Co., and the site selected is on the Tyne, opposite the great Ordnance Works at Elswick. The intention is to enclose with floating booms a water area about 250 yards long and 50 yards wide. Within this enclosure eight barges will be moored, two of which are to be used as powder magazines, while the other six barges are to provide the necessary accommodation for the manufacture and filling of cartridges and explosive shells.

Alkali Dividends.—The Liver Alkali Co. who purchase saltcake and make from it caustic soda, have just declared an interim dividend of 5 % for six months, not a bad return for a trade always bemoaning that its only salvation is "bleach."

The Castner Process at Oldbury.—The building of this work is progressing rapidly. We hear that Messrs. Neill and Son are pushing on with the erection of a large Weldon plant for chlorine making in connection with the process.

Gas Explosions at Halifax.—Late on Monday night in last week some terror was occasioned in the neighbourhood of the Halifax Corporation Gasworks by explosions of gas. There is a 20in. main in Cripplegate, and a leakage is supposed to have occurred from this or from the governor-house. The gas escaped into a cottage, where two women were found insensible. Later on, an explosion occurred in the same house, blowing out all the windows and setting fire to the property. As workmen were searching for the source of the escape, an explosion occurred, about one o'clock in the morning, at the governor-house, and the cover of manholes was hurled some 60ft. or 70ft. in the air, and fell upon a footpath, where some people had a narrow escape. Another explosion occurred, and it was deemed prudent to turn off the gas, and part of the town was left in darkness yesterday morning. Mr. Carr, the engineer, is at present away for the benefit of his health.

MORE CAUSTIC SODA.—We hear on good authority that the Newcastle Chemical Works Co. (commonly known as Alhusen's) are about to increase their output of caustic soda to 300 tons per week, and that they have made up their minds to concentrate the weak caustic liquor in a Yaryan multiple effect evaporator.

HESSIAN FLY.—A complete report on the attacks of the Hessian fly in different parts of Great Britain during the past year, with directions as to the best means of preventing or dealing with future encroachments of this unwelcome foreign visitor, has just been issued by Miss E. A. Ormerod, Consulting Entomologist to the Royal Agricultural Society. This useful report is published by Messrs. Simpkin, Marshall and Company.

A GERMAN-CHINESE BANK.—It is stated that the negotiations carried on for some time past by the Royal Seehandlung for the establishment of a German-Chinese Bank are approaching conclusion, and that the capital of the bank will be 20,000,000 marks.

THE NEW STEEL WORKS.—The first sods of the new steel works of the Dowlais Company at Cardiff were cut on Monday, the 2nd inst. The works are to cost £500,000. It is anticipated that the establishment of the works at Cardiff will give a strong impetus to trade.

ANNOUNCEMENT.—Messrs. James Lewis and Son announce that the branch of their business conducted under the title of the Liverpool Copper and Silver Ore Wharves has been incorporated into a limited company, and will be continued as "James Lewis and Son's Liverpool Copper Wharf Company Limited."

THE COPPER RING.—Copper has been the big gamble the entire week through, but prices are getting to a very dangerous level. The entire movement is a speculative one, and worked altogether in Paris by French operators. Of course it may be that these individuals can afford to lock the metal up and wait patiently. But the odds against are too great to recommend one way or the other. Many reasons are given for the rise, all more or less hingeing on problematical new requirements, one argument being that copper is to take the place of wire for telegraph and telephone manufacture, and another that the new small bore cartridges are to be made of the metal, or at any rate coated with it. We have seen some of these latter projectiles, and certainly they were manufactured of copper, or a compound in which (judging from appearance) it entered largely.

EXPLOSION IN AUSTRIA.—A terrible explosion occurred on Saturday morning in a manufactory of explosives at Wiener Neustadt, situated near Vienna. Six persons perished in the flames.

A PHOSPHATE ISLAND.—Large amounts of phosphate rock are being landed at this port from the Island of Redonda, British West Indies, consigned to the new phosphate works at South Camden, N. J. The soil of the island, which was recently purchased by English parties, was supposed to be worthless, but upon an analysis being made it was discovered to possess fabulous wealth. The fact that this rock is brought into competition with the Southern phosphate rock has been the means of starting others to look in the same direction. The Island of Redonda lies eight miles from Montserrat and thirty-five-miles from St. Kitt's, and rises 1,500 feet, showing a bare white rock. This whiteness is said to be due to the number of sea birds which frequent the island to lay their eggs and rear their young. The rock is procured from the almost perpendicular cliffs with great difficulty, and is discharged into lighters, and subsequently into the vessels awaiting loading. Labourers are procured from the adjacent islands, and they procure sufficient meat for their sustenance from the game which abounds on the island. The British barque *Mary* has landed several thousand tons of phosphate here, and is now bound out for another cargo.—*Philadelphia Record*.

IMPORTANT.—Cocaine is getting into discredit. M. Laborde has communicated to the Physiological Society of Paris the fact that one of his colleagues has narrowly escaped death from a dose of cocaine, taken for the purpose of having a tooth extracted. He became deadly pale, completely lost consciousness for a while, suffered intensely for some time, and had the sensation of approaching death. Several cases of a like character, it is said, have occurred in this country; and they have been still more frequent in America.—*Invention*.

AN OLD BUSINESS CHANGING HANDS.—Messrs. Henry Wiggin and Co. have purchased the red-lead business carried on for so many years by Messrs. Thos. Adkins and Company, of Smethwick.

COPPER MINING.—Copper mining shares have naturally followed suit in an upward direction, and Rio Tintos, Mason and Barry's, New Quebradas, Panulcillos, and many other concerns whose names had been almost forgotten, have been dragged from obscurity and paraded up and down for speculative purposes. But as we say of copper, so we say of copper shares—very dangerous.

ISOLATION OF FLUORINE.—Another difficult chemical feat has been performed by M. Henri Moissan, who has succeeded in isolating in considerable quantities the element fluorine. A detailed account of the experiments appears in the December part of the *Annales de Chimie et de Physique*. The examination of its properties has proved it to be the most intensely active of chemical elements. All organic compounds are violently attacked by it, alcohol, ether, benzine, and turpentine immediately take fire from contact with it.

ELECTRIC LIGHTING IN INDIA.—Lord Dufferin's new Viceregal Lodge at Simla is to be lighted throughout by electricity; nearly 1,000 glow lamps will be employed. The circumstance is noteworthy, inasmuch as this is the first Indian palace so lighted. The work is to be carried out by Mr. W. H. Massey, of Twyford, Berks, electrical engineer to Her Majesty.

LEAD.—We hear that lead is soon to become the subject of careful consideration.

SACCHARINE.—*The Cardiff and South Wales Gazette* says:—Sir Henry Roscoe has been writing a paper on saccharine, the new sweetening substance which has engrossed much attention in the medical world since it was beneficially used in the case of the Crown Prince. Sir Henry, in common with all authorities, admits the immense value of the product in pharmacy, but alleges that its price puts it out of competition with sugar as an article of common use. I have some later information on this point, a fact which will be interesting to Sir Henry Roscoe and others. Saccharine, as is by this time pretty well known, is a product gained out of coal-tar by a German chemist as the result of many years' patient investigation. Towards the end of last year an enterprising London firm purchased the right of sale in England. Within the last few weeks the firm of Sir Reginald Hanson, late Lord Mayor of London, have been associated in the distribution of the new commodity, which, through their widely-spread agencies, they are introducing to the notice of grocers. Saccharine is sold at the rate of 4s. 9d. an ounce, and, as an ounce is equal to 18lb. of sugar, it is easy to make a calculation which will show that Sir Henry Roscoe is a little hasty in his conclusions.

STOPPAGE OF THE LANGLEY SMELT MILLS.—With the close of the year 1887, says our Hexham correspondent, Langley Lead Smelting Mills, in the Hexham district, which have been established for considerably over a century, though latterly giving employment to only a small number of hands, have been closed, and are to be speedily dismantled, and the machinery, plant, etc., sold. At one time the south-western portion of the county had several of these mills in active operation. Forster, in his "Section of the Strata," mentions the following smelting houses as being (A.D. 1809) in the possession of Colonel and Mrs. Beaumont, viz.:—Allen Mill (Allendale Town), Allenheads Mill, Blaydon Mill, and Dukesfield Mill (Hexhamshire). Of these only Allen Mill is now in operation, and only a limited number of men are employed there. Of Langley Mills, it may be mentioned that they were carried on by the Commissioners of the Greenwich Hospital until 1833, since which time they have been worked by private enterprise. For many years these extensive smelting mills were in the hands of Messrs. Joseph Dinning and Co., and under their active management employed a good number of workmen. For several years past, however, lead mining and lead smelting have been in a depressed state, and now, following in the wake of the Allenhead Mill and the Hexhamshire Mill, these mills have also been closed.

CORN-STALK AND PRARIE-GRASS FUEL.—Some one in Iowa has introduced to notice a new fuel, which is destined to take the place of coal in the prarie countries. The fuel is made by grinding corn-stalks and coarse prarie-grass together, moistening them and then pressing the pulp into blocks about 12in. long and 4in. thick. These blocks are then dried. It is claimed that one block will give an hour's steady heat, and that the fuel can be produced for $3 per ton.—*Invention*.

HYDROFLUORIC ACID AS A DISINFECTANT.—A committee of the French Academy of Medicine has reported very favourably on the influence of hydrofluoric acid in checking the development of tuberculosis. The bacilli are speedily destroyed by the vapour.

Margarine.—On the last day of the old year an old foe of the farmers—"butterine"—passed out of legal existence, and margarine takes its place. A rose by any other name will smell as sweet, but it is probable that the grocers will have to refuse many a customer for "butterine" before the new name is known. The new measure, described as for the better prevention of the fraudulent sale of margarine, enacts that all imitations of butter shall be sold as "margarine," and that the wrappers or packages in which they are sold shall be so marked; that the onus of proof shall lie upon the vendor whenever the defence is set up that he believed margarine sold or kept for sale by him to be butter, and that expenses of prosecutions under the Act may be paid from penalties.

Asphalt Pavements.—The wearing surface is composed of four parts, viz.: 1. Refined asphaltum. 2. Heavy petroleum oil or the residuum of the same. 3. Fine sand, 4. Fine powder of carbonate of lime. Asphaltum is refined and brought to a uniform standard of purity and gravity. The heavy petroleum oil, which may be the residuum by distillation of petroleum, must be free from water, light oils and other objectionable impurities, of specific gravity 18° to 20° Beaumé, and must bear a heat test of 250° F. By melting and mixing these two hydrocarbons, heavy petroleum oil and asphaltum, the matrix of the pavement, called "asphaltic cement," is obtained, which cement has a fire test of 250° F., and at a temperature of 60° F. has specific gravity of 1·25. They are mixed in the following proportions by weight:

| | |
|---|---|
| Refined asphaltum | 100 parts. |
| Heavy petroleum oil | 20 parts. |

The pavement mixture is formed of the following materials, and in the proportions stated:—

| | |
|---|---|
| Asphaltic cement, from | 12 to 16 |
| Sand, from | 73 to 67 |
| Pulverised carbonate of lime, from | 15 to 17 |
| Total | 100 100 |

*—Oil, Paint and Drug Reporter.*

The Spanish Customs Tariff.—The Spanish Customs House authorities have decided that cotton and silk tissues stuck on paper will pay a duty of 4 pesetas per kilo., and tissues with a silk and cotton warp and a weft of wool, silk, and cotton, mixed with metal, will come under the heading 154 in the tariff, and pay 40 pesetas 40 cents. per kilo.

Taped Curtains.—The Exchange Telegraph Company learns that the Foreign Office has informed the Nottingham Chamber of Commerce that, under the Commercial Treaty recently concluded between Italy and Austria, curtains taped will pay 10 % additional duty instead of 50.

Ceylon Tea.—The growth and marvellous success of tea growing in Ceylon was skilfully brought before the Royal Colonial Institute on Tuesday by Mr. John Loudoun Shand. At a time when the prosperity of Ceylon had sunk to the lowest ebb, an experiment was made in growing tea. Notwithstanding the difficulty of obtaining capital, the attempt succeeded, and now the most improved methods of cultivation, the best machinery, the most scientific ways of preparing the leaf have resulted in Ceylon tea being regarded as the very best in the market. In Mincing Lane, Ceylon tea commands prices 50 % higher than that grown in Java or China. Only 50 % of the tea imported into Great Britain last year came from China. The success of Ceylon is a splendid illustration of the benefits of trained skill, capital, and improved methods brought to bear upon an industry hitherto carried on by "rule of thumb," Ceylon contains hundreds of thousands of acres which can be used for the cultivation of tea, should the demand increase. The small Chinese cultivator, with his primitive appliances and antique methods of farming, is rapidly going to the bad. Still the natural conditions in China such as climate and fertility of the soil, cannot be surpassed, and there is yet a chance for the Chinese farmer if he will readjust himself to the altered conditions brought about by competition.

Charge against a Tobacco Manufacturer.—Yesterday, at the county court, Edinburgh, James Sutherland, tobacco manufacturer, High-street, was charged with having had in his possession a quantity of tobacco unduly watered. Evidence was given to the effect that three samples of the weed obtained from Sutherland had on drying decreased in weight respectively by 39·5, 38·5, and 35·7 %, the legal limit being 35 %. Mr. Morrison, S.S.C., proposed to call Mr. Sutherland, but this course being objected to, the case was adjourned to allow the bench to consider the point.

Society of Chemical Industry.—The third meeting of the session of the Glasgow and Scottish Section of the Society of Chemical Industry was held in the hall of the Philosophical Society, Bath-street, last Tuesday, Mr. J. J. Coleman presiding. A paper on "The action of water on lead," prepared by Professor Carnelley and Mr. W. Frew, was read by the latter, in which the results of various experiments in connection with the laying of lead pipes for the water supply of towns were described, and the action of different chemicals on the metal explained. Loch Katrine water was found to be unusually corrosive, and its introduction into Glasgow had led to a series of useful experiments. In almost all cases it was found that corrosion was much greater when the pipes were exposed to the air than when the air was excluded. A short discussion followed, Discussion on the papers already read by Professor Dittimar and Mr. Mellon was postponed till a future meeting. Mr. J. J. Coleman, F.R.S.E., F.I.C., read a paper on "The present aspects on the sewage question," in which he referred to the various methods of disposing of sewage, and after describing the condition of Glasgow fifteen years ago, detailed several of the suggestions made for improvement, but notwithstanding Royal Commissions, deputations, and Acts of Parliament, matters, he said, remaided *in. statu quo*. Mr. G. G. Henderson, M.A., afterwards exhibited Franke's gas burette.

The Revival of Trade.—The seventy-ninth half-yearly meeting of the Union Bank of London was held yesterday at the City Terminus Hotel, London. Mr. T. R. Grant, the governor, in declaring a dividend for the half year at the rate of 12½ % per annum, said they began the half year in July with a very dull state of business, when the Bank rate was down to 2 %, and when it was difficult to lend money at all. From that time forward, if it were to be measured by the Bank rate, the money market had had a steadily hardening tendency, but even the maintenance for four months of the Bank rate was very far from being a correct index of the outside value of money in the market, and they had experienced constant fluctuations. There had, however, latterly been more activity abroad. Speculation had done something to foster that, but he hoped there was an amount of sound prosperity once more growing up amongst us.

The St. Helens Alkali Inspector.—The following cutting is from a St. Helens newspaper:—"At a meeting of the Health Committee, held on Wednesday morning, it was resolved that the town clerk write to Mr. Fletcher, chief inspector under the Alkali Act, upon the subject of the report made to this committee that Mr. Ballard, who for some time has acted as inspector resident in St. Helens, is about to leave the district and reside in Chester, objecting to the town being left without a resident inspector."

## CHEMICAL ENGINEERING.

THE first of a course of twelve lectures, on the subject of chemical engineering—in which great attention is now being paid in Germany—was given last Wednesday, by Mr. George E. Davis, late Government Inspector of Alkali Works, at the Manchester Technical School.—Mr. Wm. Mather presided, and, in introducing the lecturer, said Mr. Davis was highly qualified to speak on this subject of chemical engineering, which was of vast importance to this country. Speaking from his own experience as an engineer he felt there had been a wide gulf between chemistry and engineering up to the present time in our own country They were closely allied, and he could not himself imagine a successful chemist who had not some elementary knowledge of engineering, and much less could he imagine a successful engineer who had not some knowledge of the elements of chemistry. There was no subject used in our various manufactures or arts that did not undergo some chemical change before it could be used, and especially was this the case with regard to metals. All those who were connected with metallurgical operations must feel, as time went on, a greater need of chemical knowledge in order to understand more thoroughly the various problems connected with those operations. One of the greatest examples of what was meant by chemical engineering was the discovery of Bessemer steel, which was purely a combination of chemistry and mechanics, and was a striking instance of the great results of the chemist and the engineer being combined in one man. Again, they would find that with regard to their alkali manufactures, a combination of the chemist and the engineer was absolutely essential for the best results. His belief was that if chemical engineering was

better understood, both by chemists and engineers, the laws of both combined in perfecting the operations on one side and the other, would enable us to prevent the continuance of those pernicious influences to vegetation, and even to the human system, which were caused by the various gases and the emission of smoke in our large towns, and would yet allow us to carry out our various manufactures without those injurious effects we all deplored. If the young engineer was to undertake the many duties which would be demanded of him in the future, he must be acquainted with these allied sciences, which had been sadly neglected in the past. Mr. Davis, in his lecture, defined what was meant by chemical engineering, and the conditions imposed on the engineer owing to the physical character of raw materials and spoke of the facilities afforded for studying the subject in Germany and other countries.

## Queries and Replies.

VITRIOL CRYSTALS.—What is the composition of the crystals which appear in cold weather at the bottoms of carboys of oil of vitriol?—A FOREMAN BLEACHER.

STRENGTH OF AMMONIA.—I have just bought some ammonia from a new district for 24° strong, and upon its arrival find it only to be 18° by my glass, whereas, when tested by the seller's glass it is fully 24°. Will any of your readers who understand this business tell me where the discrepancy arises?—DYER.

CEMENT.—A good cement for caulking gas valves may be made by moistening fire clay with a solution of water-glass or silicate of soda of 50° Tw., and working up well into a paste. The cement sets very hard under the influence of heat, and I do not know any better.—E. J. BROWN.

LIME MUD.—It is difficult to say how much soda is left in lime mud, as there are so many methods being adopted. Some works causticise very strong, and return the "slutch lime" to the revolver, while others try to wash all the soda out before using it again. I believe that your inquirer, "Paper Maker," may take it for granted that 5 % of the total soda passed through the process remains in the lime mud.—ALKALI CHEMIST.

BLEACHING POWDER.—In reply to your correspondent, "G. G. C.," 100 tons of good sieved lime will produce about 180 tons of bleaching powder, testing 36 %; and a ton of lump lime will practically yield a ton of sieved lime.—JOHN.

GAS PURIFICATION.—Yes, the finer particles of the "blue billy," or the residue from copper extraction, may be used for purifying gas if mixed up with a little acid and sawdust. It is, however, not so active as bog ore. I believe Mr. Frith, of Runcorn, has used it some years ago.—J. B. B.

PYRIDINE.—Can any of your readers tell me how much it is possible to obtain from 100 tons of coal-tar?—TAR DISTILLER.

PITCH.—You would be conferring a benefit upon the tar trade by giving some information respecting the use of pitch as a fuel for tar stills.—OVERSTOCKED.

MINERAL OILS.—What is the best way of testing mineral oils for lubricating purposes?—ENGINEER.

## THE NEW TRADE MARKS ACT.

AMONG the Acts of Parliament which came into operation on the first of the month, there is one which will probably have a very important bearing on a great many branches of trade. We refer to the new Trade Marks Act, which is much more stringent in many respects than the old Act. In the provisions of this new measure it will be no longer possible to bring in "port" wine, or "Havanna" cigars manufactured in Germany. To pass muster every named import must be shown to have come from the country of its manufacture. Thus the German cigars, hitherto called Havannas, will have to bear upon their boxes palpable evidence of a German origin; and in like manner the knives and scissors, which have hitherto passed muster, though of German make, as Sheffield cutlery, will have to bear also upon the face of each article an indication of its foreign make. Thus the patriotic fair trader will be no longer seduced, without knowing it, into the purchase of goods which are not really English. Even photographic mounts and cases, with other light and fancy goods of a similar sort, not usually made in England, but brought almost exclusively from other countries, will now have to be stamped as "French" or "German," as the case may be." There is no doubt the first operation of the Act will be attended with considerable inconvenience to traders, who may be ignorant of its provisions, for the goods which do not comply with the requirements of the measure will be stopped at the Custom House, and may be even confiscated, unless satisfactory explanations be forthcoming. This will probably be felt locally in the case of butter, cheese, and other provisions. "Danish" butter from Rotterdam, and "Dutch" cheese from Chicago will no longer pass muster, save under the names of the countries of their origin. It would be well for local importers and traders to study the provisions of the Act very closely, otherwise much loss and confusion may ensue.

## CANADIAN CONDENSED MILK.

MR. John Dyke, Canadian Government agent at Liverpool, in his report to the Minister of Agriculture, which was submitted to his Excellency the Marquis of Lansdowne, Governor-General of Canada, points out the advantage that would accrue if Canada would enter into the trade in condensed milk, and urges upon agriculturists and others in the various provinces in the dominion, and especially the north-west, the advisability, and in many cases the absolute necessity, of producing articles in a condensed and non-perishable form, and thus reduce to a minimum the cost of transit and the risk of damage. The condensed milk trade to which Mr. Dyke has frequently referred in his reports has not expanded in the Dominion as he had hoped. From Switzerland last year there were nearly 30 millions of tins of condensed milk exported. In England and in Ireland several condensed milk manufactories have been established, and in proof that they have succeeded it is only necessary to say that the £10 shares of the Anglo-Swiss Company are now selling at £50. In this connection the following extracts from returns recently published for the first time will be found interesting, The export of condensed milk from Switzerland during the first nine months of 1886 was:—To England, 8,323,200 kilos., valued at 8,476,537f.; to Canada, 17,000 kilos., valued at 14,500f.; and to the United States, 93,200 kilos., valued at 97,167f. The total for the nine months was 9,670,900 kilos, valued at 9,914,411f. We may mention that the Royal Agricultural Society of England are alive to the importance of encouraging this trade in tinned milk, as it would afford great facilities for the supply of milk in farms that are remote from railway stations and other convenient communications, and as this trade is likely to expand considerably—especially the export trade to South America, India, China, and other hot climates—they are offering prizes for the best apparatus for condensing milk suitable for use on the farm, at the show to be held in July next.

## ANNUAL REVIEW OF MINERALS, CHEMICALS, AND COLOURS.

BY G. G. BLACKWELL.

MINERALS.—At this time last year it was anticipated that we had touched the lowest point in prices. Notwithstanding the large trade that has been done during the year, the importations being above the average, prices have rather receded than improved, as was then expected.

MANGANESE ORE.—The imports again this year have considerably increased in quantity, and although we started the year at lower prices than had ruled for many years previously, we close at still lower figures than when we commenced, notwithstanding better prices ruled during part of the year. As to stocks they are above the average, both at Garston and at the consumers' works. The production is still increasing, and fully meeting the demand, so that if there should be any change in prices, it will be an advance, especially as the prices ruling over the last few months have been lower than has been known in the history of manganese. The quality of the ore imported over the year has continued very good indeed, and will compare with any previous importations.

IRON ORE.—The consumption of this, especially the better class of ore, has very much improved during the last few months, and prices have advanced considerably. There is, however, a good deal of room for improvement.

Barytes.—Best qualities have been in considerable demand. The advancing prices reported last year have not only been maintained but improved upon, both for carbonate and sulphate.

French Chalk.—The demand and consumption of this article has increased very much during the past year, and the quantity imported has been very materially above the average; notwithstanding this, however, prices have rather gone back during the last few months, chiefly through unhealthy competition; nevertheless, if the demand continues to increase, we hope to see an improvement in prices. The mining and milling resources are fully up to the mark.

Magnesite.—This article has suffered materially both in consumption and price, and although practically more has been consumed during 1887 than the previous year yet prices have ruled very much lower this year. The low price is likely to continue, as the production is almost unlimited.

Chrome Ore.—The importations this year have been fully above the average. Prices started at a lower point than has ever been known. The demand, however, has greatly improved, and we close the year fully 10s. better than we began. We look forward to a great increase in price.

Emery.—Importations and prices have ruled very steady during the year without any special point calling for comment,

Phosphate of Lime has suffered a material reduction, although the quantity consumed has been above the average.

Strontia.—Further discoveries have been made, and prices have still receded, although a large quantity has been consumed.

Antimony.—Like other minerals this has suffered a decline, chiefly on account ot the increased importations being above the consumption.

Bauxite.—On account of various improved patents the consumption of this article has materially improved, and a greatly increased trade is looked for during the coming year. At the same time prices have been practically unchanged, the supply being fully up to the demand.

Ferro-Manganese—Although our manufacturers have been kept fairly at work prices have very materially receded, and are very much lower than they were twelve months ago. The prospect of the coming year must be that of a rise in prices.

Chemicals.—There has been a great improvement in business during the year, although there have been material fluctuations in prices. On the whole, however, there is little change to report. The combination formed for the output of bleaching powder has been well maintained, and prices have ruled strong throughout the whole year.

Colours.—Our market has been very well supplied, and prices all the year round have been easy. There is room for an improvement in prices in many colours, but at the moment there is little chance of any great increase.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

The market has not quite recovered its normal standard of indication, after the gap caused by the holidays, but so far the signs are not unfavourable. A reasonable measure of business is being put through this week, and at prices on the whole maintained. Sulphate of ammonia has made a further rise, and the average of prognostication in the trade is in favour of a still higher mount, although the boom must now be certainly nearing the point of exhaustion. Paraffin products are all steady at quotations already noted, except spirit, which gives way to some small extent. Oil (burning) readily fetches 7d. a gallon for passable brands; but the famine figure on rumour a fortnight ago is not now spoken of, and it does not appear that it ever rested on any basis of fact. Bleaching powder has lost tone after a good time of well-sustained vigour, and only a very moderate business is on report, but makers have not let go quotations to any marked degree as yet. Despatch of bichromates from the Glasgow and Irvine works has distinctly mounted within the fortnight, and is now over the average of the past six months. Chief prices current are:—Soda crystals, 41s. 6d. net Tyne; alum, £5 less 2½ % Glasgow; borax: English refined, £31, and boracic acid £46 net Glasgow; soda ash, 48/52°, 1d. less 5 % Tyne; caustic soda, white, 76° £8. 5s., 70/72° £7, 60/62° £6. 1s. 3d., and cream, 60/62° £6. 1s. 3d. less 2½ % Liverpool; bicarbonate of soda, 5cwt. casks, £5, 15s., and 1cwt. casks, £6 net Tyne; refined alkali, 48/52° 1½d. less 2½ % Tyne; saltcake, 21s. 6d. less 2½ % f.o.r. Glasgow; bleaching powder, £7. 17s. 6d. less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d. less 5 % and 6 % to Scotch and English respectively; nitrate of soda, 9s. 3d. to 9s. 6d.; chlorate of potash, 6½d. less 5 % any port; sulphate of ammonia, £13 f.o.b. Leith; paraffin scale, hard, 2½d., soft, 2d.; paraffin wax, 120° semi-refined, 3d., and re-melted 2½d.; paraffin spirit, 6d.; burning oil, 6d. to 7d.; lubricating oil, 885°, £6. 10s. to £7.; sulphate of copper, £22. Week's imports include 11,758 tons iron ore, 1,300 tons pyrites of copper, 1,309 barrels wax, 570 tons rock salt, and 11,621 bags sugar.

## MISCELLANEOUS CHEMICAL MARKET.

There are no important changes to record in the course of prices. The absence of any unusual demand or speculative movement has kept values within the ordinary slight margins of fluctuation. Nitrate of soda may perhaps be considered an exception, but the present figure of 9s. 9d. Liverpool is not likely to be long maintained in view of ample supplies ahead. Sulphate of ammonia is well maintained, and the demand for other ammonia products is good all round. Tin, copper, zinc, and lead salts are selling freely at current prices. Nitrate of lead is a shade dearer. Carbolic acids are in good request, and selling freely; makers as a consequence are firm in their prices, and the present value of crude material makes any early relapse improbable. Acetates of lime are quiet, but without change in price. Wood naphthas are dearer. Sugar of lead, English and Foreign, are without sign of any fall in price, though demand at the moment is quiet. Alkalies (soda) are quiet: prices of all kinds are without material change. Potash is likewise unchanged in value. Chlorate of potash is well maintained: price in quantity is 6⅜d. to 6½d. per lb. spot delivery.

## LONDON METAL MARKET.

Friday.—Copper firm, but not active; Chili, £85 12s 6d. to £85 15s. cash; three months nominal. Tin more active and firm; Straits, spot and January prompts, £167; December shipment from Straits, £160; three months, £145 to £148; English ingots, £150. Spelter, £21 10s. Spanish lead, £15 to £15 2s. 6d.; English, £15 10s. Scotch pig iron, 42s. 6d. cash. Quicksilver, Rothschild has accepted £10.

## THE ALKALI MARKET.

The demand for bleach is still very active, much more than usual being exported. Judging from the quantity of chemicals absorbed by the States we should say that trade there was very brisk. Caustic soda and alkalies generally may be said practically to be without change, if anything, the tendency is to weakness. Our Liverpool correspondent writes that there were several directors or shareholders of the Weldon's Chlorine Process Co. present at the meeting of the Liverpool section of the Society of Chemical Industry, on Monday last, to hear Professor Dewar play the Pechiney process on his fiddle for the second time this session; but we do not know whether our correspondent is jesting or in earnest when he writes that he has found a new use for Professors of Chemistry. Seeing that they stand convicted out of their own mouths of neglecting the subject of technical education, he suggests that they be trained as "drummers" for the introduction of new processes, but adds, that the savage glee with which the probable Stassfurt competition was heralded, should be slightly toned down when speaking before a British audience.

Judging from the "professional" drumming" the Hollway process had, the Castner process, and now the Pechiney process, not to mention several others, and the success some of them have attained, we are not quite sure whether our correspondent can be serious in his remarks.

## THE LIVERPOOL MINERAL MARKET.

The market during the past week has been rather active for the first week in the year. Manganese: As usual at this season, imports have continued small; prices unaltered. Magnesite (containing 98 per cent. of carbonate of magnesia), more inquiry, but prices are unaltered at 30s. to 35s. for raw lump; raw ground, £6. 10s., and calcined ground, £10 to £11. Bauxite (Irish Hill brand) still in good demand at 20s. for lump; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk: The prices of last week continue, 80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate): Best quality particularly continues scarce, and prices are firm. Selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate unchanged; best lump, 35s. 6d.; good medium, 30s.; ground, best white, GGB. brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone: Fair demand for good qualities; ground, £6. 10s. to £7. Iron ore stronger. Bilbao and Santander, 7s. 6d.; Irish, 10s. Purple ore, 6s. Emerystone steady at £5. 5s. to £5. 15s. for lump; small, £5. Fluor and felspar quiet. Fullers' earth steady; 45s. to 50s. for best blue and yellow. Wolfram and tungstate of soda quiet without change in prices. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore is in demand, and prices are stronger. Antimony ore, £8 to £10. for fair quality. Antimony metal, £31 to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 18s. 6d. Carbonate (native), £15 to £16; powered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good £20 to £21; chips £8 to £16. French sand, in cargoes, 16s. to 17s. Ferro-manganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, original prime, £18. to £23. Ground mica, £50.

## THE LIVERPOOL COLOUR MARKET.

Prices without alteration. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £17. Red lead, £16. Oxide of Zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto lb. jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## THE SULPHATE OF AMMONIA MARKET.

The sulphate market is very firm, and £12 18s. 9d. to £13 must be considered as being the Hull price. Every effort is being made to keep down Hull values, and the *ruse* of going into the Leith Market instead, has served for once to raise the Leith prices to a level with those at Hull. A large quantity has been sold at Leith at £12 18s. 9d. less 3½ %, and some quantity forward at £13. For Beckton make £13 has been paid, and the same price is also asked for outside London makes. Continental consumers have now, perhaps, found out that the London advice they have acted upon during the past two years has not been of a very reliable kind; the question is, will they follow it again?

## THE TAR PRODUCTS MARKET.

The nominal price of 90's benzol remains the same as last week, we say the nominal price, as it is quite evident that holders of stock are preaching the doctrine of high prices in order to induce foreign consumers to cover their forward requirements. Some time ago certain people paraded the country declaiming against the carbonisers, and raising the standard of "over-production." There is to-day more carbonising benzol being produced than ever, for all the carbonising works are in full swing, as we predicted three months ago they would be. Other tar products seem inclined to remain firm, even if they do not rise in value, 50/90 benzol, solvent naphtha, creosote, carbolic acid, and anthracene all look healthy, and with the exception of 90's benzol and pitch, the tar trade may be considered in a very fair position; but it is doubtful whether circumstances are as prosperous as some of the "rings" would have us believe. A great part of the London make of anthracene has been sold for all this year, so that there remains but little of A quality unsold. Carbolic acid (crude) remains much the same as last week. If aniline makers really believe that the present price of 90's benzol is a sound one, why do they not immediately advance the price of aniline oil and salt to its legitimate figure, surely if aniline oil was worth 8d. when benzol was selling at 1s. 6d. per gallon, it is worth 1s. 6d. now that benzol is *quoted* at 3s. 9d.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Separating Arsenic from Hydrochloric Acid.** Michel d'Andria. 17908. Dec. 30, 1887.
**Residues from Galvanising Works.** M. d'Andria. 17909. Dec 30, 1887.
**A New Re-agent for Bleaching.** Herbert Finch. 17921. Dec. 30, 1887.
**A Black Liquid from Aniline, etc.** C. Collin and L. Errain. 17925. Dec. 30, 1887.
**Retorts for Making Charcoal.** E. Rider Cook and J. W. Ingham. 17938. Dec. 30, 1887.
**Burners for Petroleum Lamps.** F. J. B. Allen. 17940. Dec. 30, 1887.
**Extinguishing Devices for Round Wick Lamps.** Eckel and Glinicke. 17941. Dec. 30, 1887.
**Lamps for Burning Petroleum.** F. J. B. Allen. 17942. Dec. 30, 1887.
**Apparatus for Ærating Yeast.** A. J. Walker. 17946. Dec. 30, 1887.
**Apparatus for Working Heated Glass.** Frank Wright and M. W. W. Mackie. 17950. Dec. 30, 1887.
**Apparatus for Working Heated Glass.** F. Wright and M. W. W. Mackie. 17951. Dec. 30, 1887.
**Manufacture of New Azo Dyestuffs.** Actiengesellschaft für Anilin Fabrikation. 17952. Dec. 30, 1887.
**Painting Iron and Steel Work.** W. F. Hurndall. 17958. Dec. 30, 1887.
**Electric Safety Lamps.** O. Y. Rhodes. 17966. Dec. 31, 1887.
**Blue Bricks and Fire Bricks.** B. Gregory. 17967. Dec. 31, 1887.
**Bleaching and Disinfecting Liquor.** E. Hermite, E. J. Paterson, and C. F. Cooper. 17969. Dec. 31, 1887.
**Treating Sulphide of Ammonium Solutions with Carbonic Acid Gas.** E. W. Parnell and J. Simpson. 17970. Dec. 31, 1887.
**Vulcanisation of Rubber without Sulphur.** S. E. Statham. 17972. Dec. 31, 1887.
**Patent Waterproof Grease.** J. W. C. Doyne. 17982. Dec. 31, 1887.
**Liquid Hydrocarbon Engines.** T. C. Hogg. 17990. Dec. 31, 1887.
**Cocoa Grinding Apparatus.**—(Complete Specification). G. Fantzen and R. Lutz. 18006. Dec. 31, 1887.
**Crushing, Pulverising, and Disintegrating.** A. W. Gleed. 18009. Dec. 31, 1887.
**New and Improved Yeast Food.** L. Briant and G. A. Clowes. 18022. Dec. 31, 1887.
**Grinding and Ærating Sugar, etc.** G. Adant. 18025. Dec. 31, 1887.

**1888.**

**Oil Lamps.** John Eshelby. 5. Jan. 2.
**Forced Draught Closed Ashpits.** E. P. Plenty. 9. Jan. 2.
**Working Peat.** M. L. Honnaij. 14. Jan. 2.
**Removing Scale from Steam Generators.** H. A. Livock. 21. Jan. 2.
**Petroleum Lamps.** A. J. Eli. 28. Jan. 2.
**Slow Combustion Stoves.** J. H. Barnard. 29. Jan. 2.
**Regulator Door for Steam Boilers, etc.**—(Complete Specification.) A. V. Ilay. 30. Jan. 2.
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**Artificial Ivory, etc.** A. de Pont. 47. Jan. 2.
**Treating Horn Waste.** A. de Pont. 48. Jan. 2.
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# PRICES CURRENT.

[THURSDAY, Jan. 12, 1888,

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids :—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6⅞ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 11 | 6 |
| Chromic, 85 % ... ... ... ... ... per lb. | 0 | 0 | 4½ |
| Fluoric ... ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 3 | 0 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 4⅛ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... ... ... per ton | 12 | 0 | 0 |
| ,, (Brimstone, 168°) ... ... ,, | 3 | 16 | 0 |
| ,, (Pyrites, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, ( ,, 150°) ... ... ,, | 1 | 17 | 6 |
| ,, (Pyrites, 150°) ... ... ,, | 1 | 6 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 7 |
| Arsenic, white powdered... ... ... ... per ton | 10 | 12 | 6 |
| Alum (loose lump) ... ... ... ... ,, | 4 | 13 | 9 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, 880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1⅝ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 48 | 15 | 0 |
| ,, ,, (pure) ... ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 17 | 6 |
| ,, ,, (grey), Hull ... ... ,, | 12 | 17 | 6 |
| Aniline Oil... ... ... ... ... ... ... per lb. | 0 | 0 | 10 |
| Aniline Salt ... ... ... ... ... ... ,, | 0 | 0 | 9 |
| Antimony ... ... ... ... ... ... ... per ton | 39 | 0 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1½ |
| Barium Chloride ... ... ... ... per ton | 7 | 15 | 0 |
| ,, Carbonate (native) ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 11 | 3 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes :—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products :—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 3 |
| Benzol, 90 % ,, ... ...per gallon | 0 | 3 | 9 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 2 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 6 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 4½ |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 85 | 10 | 0 |
| ,, Sulphate ... ... ... ... ... ,, | 23 | 10 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 72 | 10 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 33 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 1 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 16 | 10 | 0 |
| ,, Litharge Flake, ex ship ... ... ,, | 17 | 0 | 0 |
| ,, Acetate (white) ... ... ... ... ,, | 28 | 0 | 0 |
| ,, ,, (brown) ... ... ... ... ,, | 21 | 0 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 0 | 0 |
| ,, Nitrate ... ... ... ... ... ... ,, | 24 | 0 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 10 | 0 | 0 |
| ,, ,, (grey) ... ... ... ... ,, | 14 | 5 | 0 |

| | £ | s. | d. |
|---|---|---|---|
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | 6 |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ... ... ... ,, | 18 | 10 | 0 |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 5 | 0 |
| Methylated Spirit, 60° o.p. ... ... ...per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 | 0 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 9 |
| **Oils :—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 5 | 0 |
| Cotton-seed ... ... ... ... ... ... per ton | 20 | 0 | 0 |
| Linseed ... ... ... ... ... ... ... ,, | 20 | 0 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 | 6½ |
| ,, American ... ... ... ... ,, | 0 | 0 | 7½ |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 17 | 9 |
| ,, Chlorate... ... ... ... ... per lb. | 0 | 0 | 6⅛ |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | 3 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 10 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | 0 |
| ,, Permanganate ... ... ... ,, | 4 | 10 | 0 |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | 7⅝ |
| ,, Sulphate, 90 % ... ... ... per ton | 9 | 15 | 0 |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 7 | 6 |
| Silver (metal) ... ... ... ... ... ... per oz. | 0 | 3 | 8¼ |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | 9 |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 10 | 0 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ... ... ,, | 20 | 10 | 0 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... ... ... ... per cwt. | 1 | 10 | 6 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda)... per ton | 8 | 10 | 0 |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 12 | 6 |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 18 | 9 |
| ,, ,, (60 % Caustic Soda, white) ,, | 6 | 0 | 0 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 18 | 9 |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 15 | 0 |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 15 | 0 |
| ,, Manganate, 30/33 ... ... ... ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | 9 |
| ,, Nitrite, 98% ... ... ... ... per ton | 31 | 0 | 0 |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 2 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 17 | 6 |
| ,, Sulphide ... ... ... ... ... ,, | 9 | 10 | 0 |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 12 | 6 |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 15 | 6 |
| ,, Cane ... ... ... ... ... ... ,, | 1 | 0 | 0 |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | 8 |
| ,, Barium ... ... ... ... ,, | 0 | 0 | 5½ |
| ,, Copper (pure) ... ... ,, | 0 | 1 | 4 |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 5 | 0 |
| Tallow ... ... ... ... ... ... ... ,, | 25 | 10 | 0 |
| Tin (metal) ... ... ... ... ... ... ,, | 150 | 0 | 0 |
| ,, Crystals ... ... ... ... ... ... per lb. | 0 | 0 | 9¼ |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, January 21, 1888.**


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Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

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Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.

## THE PATENT LAWS.

WHAT is the object and aim of a Patent Law? Those who possess within their breasts a considerable amount of patriotism, will say no doubt—It is intended to aid and foster our trades, our manufactures, and our commerce by encouraging invention and bringing to the front all those who have new processes revolving in their brains, and who wish to benefit pecuniarily, first themselves, and then afterwards the world generally.

But the manufacturer who has a large amount of capital and plant locked up in any particular industry is likely to look at the matter from another standpoint. Whatever other industries may say of the inventor, we know that in the chemical trade he is looked upon as a hawk in the pigeon-cote, and whenever he makes his appearance there is a general flutter all round. Why this should be so it is not difficult to understand. In many other industries without the invention be of a very revolutionary character it is only a very small portion of the industry which is attacked, and though plant and appliances have often to be altered, yet the matter is not so serious as chemical inventions usually prove to be. Take, for instance, the old chlorine process; entirely new plant had to be put down to enable the Weldon process to be worked, and similarly with the Deacon chlorine process; and now if the Pechiney process had to be worked, neither the Weldon or the Deacon plant would be of any use whatever. Naturally many chemical manufacturers wish the chemical inventor at the end of the earth, rather than causing them to live in constant dread and fear, but the moral to them should be, that they should by constant and active attention to business "make their pile" as soon as they can, and by retiring make room for younger men to take some grist from the mill also.

But chemical manufacturers do as well as others take a delight in adding to the work of the Patent office, and the names of Gossage, Spence, Hunt, Pattinson, Deacon, Mond, and Solvay testify to the truth of this statement. No doubt that the object of a manufacturer's patent is the direct contrary of the inventor, pure and simple; the patents they have obtained have been for the purpose of protecting their own processes from infringement and keeping their patent in their own hands, so as to avoid competition and the inevitable lowering of prices. The inventor, on the other hand, generally lives by the royalties his process produces, and naturally he wishes his methods adopted to the greatest possible extent.

A patent law, to be of any real use to the public of a country wherein the monopoly is granted, should be framed in such a manner as to place no limit on or hindrance in the way of trade; and should, moreover, be of such a nature that it encouraged the employment of native workmen as against foreigners. If a patent law acts in a contrary manner to this it is clearly producing opposite results to those we desire, and is therefore an objectionable statute. What is now the condition of the Patent Law in England?

Previous to the passing of the last Act the whole business was notoriously bad, and where the Patent office fees eventually found a habitat has been the inquiry from many mouths.

The new Act was supposed to cure all the evils, but the experience of those well versed in the question is not such as to lead us to believe the "second Daniel" has come to judgment yet. Like most of our English measures, the Bill was pressed forward too hurriedly, and the wisdom of the action of the sub-committee of the Patent Laws Committee of the Council of the Society of Chemical Industry in sending the letter they did in the name of the Society to the President of

the Board of Trade, is very much open to question. We (in our individual capacity) took great offence at the forwarding of that letter, as we believe it was the greatest mistake the Council ever made, and we are sure would never have been endorsed by a majority of members in general meeting had it been discussed.

We may now look at the subject from another point of view. A resident abroad, neither English nor a naturalised foreigner, obtains a patent for a certain process which he never intends to work in this country, but holds the patent in order to prevent anyone else doing so. And our Government supports this iniquity, though why it would be difficult to say, seeing that it helps to swell the already long list of unemployed. If a patent be granted to anyone, or to any agent residing within this realm, it should be on the clear and distinct understanding that the process must be worked, not mythically, but really in this country. Apologists of the new law will perhaps step forward and say that such could now even be brought about by the compulsory license clause, but if they have any faith in that part of the measure they must be very sanguine men, and possess that amount of faith which is said to be sufficient to move mountains. That portion of the Act is in our opinion not worth the paper it is printed upon, and no doubt those who were in favour of its forming an integral portion of the statute have now recognised their error of judgment.

The fact is that now, even under the new and improved Act, an alien can and does secure patents for processes carried out in his native country, thus employing and keeping from starvation his own countrymen to the detriment of our own, and the patents granted to them by our own Government have never been intended to do aught else than to prevent the articles being made in this country and so competing against them. This portion of the Act stands sadly in need of revision; the licensing clause is a farce, and the examination is hampered by those conditions we fully expressed at a meeting held in Manchester in 1874, to consider the revision of the Patent Laws as they then stood. The examination clause seems not to have been a happy one in its execution, and the recent abolition of the office of superintendent of examiners seems to point to the correctness of our views.

Let us now leave our own shores and pay a visit to Germany. We shall find in that country the statutes not satisfactory to the bulk of patentees, especially the holders of chemical patents. The *Chemiker Zeitung*, in a series of articles "On the Revision of the Patent Laws," shows in a very clear manner how Germany is determined to protect itself from the influx of alien productions.

In its first article our contemporary says, that during the inquiry regarding the revision of the Patent Laws, the following questions were put before the experts in consequence of very numerous complaints that had been made regarding the insufficient protection granted to the chemical industries:—

(1) Is it directed to express distinctly in the statute, that the patenting of a process (more especially in one having reference to a chemical production), shall have the effect of giving a right of sale of the product manufactured, and is this to be dependent upon the will or permission of the possessor of the patent?

(2) Do indications exist that products which are manufactured according to a process patented in the interior, are imported from foreign parts to any considerable extent, to the detriment of the possessor of the patent?

(3) Would a legal declaration of the contents, justify, that on the importation of fresh materials from foreign parts, the process of production of which is patented at home—would justify the supposition until it is proved to the contrary, that the production of the articles in question has been effected according to the patented process?

During the very interesting discussion which took place on these questions, in which Dr. H. Caro took part, the conviction was arrived at that an answer in the negative or affirmative did not appear to be desirable. A unanimous feeling was manifested that the general question formulated by the president of the Patent office to this effect:—"Whether a "necessity existed for obtaining protection, in a suitable "legal manner, for all those who have patented a process in "Germany, against the importation of products manufac-"tured abroad according to this process" should be confirmed (with only one dissentient voice), in order to first of all give expression to a material view or opinion, leaving the further legal aspect of the matter, in face of the various points that had been raised during the discussion to consideration at some later stage. On the suggestion of Herr Klüppel, however, the following special recommendations of Dr. Caro were accepted:—

(1) In § 1 of the Patent Law the following alteration occurs: Discoveries of materials should not be patentable which are produced by chemical means when the discoveries are not at the same time distinct processes for the production of the articles.

(2) § 5 of the Patent Law should contain the following addition:—If a chemical product forms at the same time with the specified process the subject of the discovery, then the action of the patent does not come in force against those who manufacture the product by another process, or bring into the market a product so manufactured or render it saleable.

The first proposition was brought forward with a view that an article which according to the previous law was hitherto excluded from the patent, can then be patented, when at the same time a definite process for its production is cited and likewise patented with it.

The second proposition will, from the outset, exclude all relations of dependency between any probable later further process for the production of the same article and the patented process.

In another article the *Chemiker Zeitung* continues:—

The commission which had to report upon the result of the inquiry has endeavoured to formulate these ideas which constituted the basis of the Caro proposals. It has, however—going even beyond the limit of the Caro proposals—considered that if the protection to be afforded to the possessor of a patent, more especially having regard to products emanating from abroad is to be an effective one, the consumptive utilisation of these products must be prevented, as well as the sale and offering of the same. It has, therefore, not limited itself to inserting (adding to) in § 1 and 5 of the Patent Law decisions, which in the main correspond with the Caro proposals, but it has also been compelled to entertain a corresponding material alteration of § 4.

According to the views of the commission it would have to run as follows:—

§ 1 Division 1 unaltered: then further exceptions are as follows:—

(1) Discoveries (Inventions) the utilisation of which would be opposed to law and usage.

(2) Discoveries of articles of food, luxuries, and medicine. The patenting of a specified process for their production is not excluded.

(3) For articles which are produced by chemical means a patent is not to be granted, unless the discovery at the same time consists of a process for the production of

the material, and also for this a patent is granted. For the invention of a process for the production of such articles a patent cannot be granted, unless the process and the separate articles which it is intended to produce are clearly indicated.

§ 4. The patent has the active power that no one is entitled without the permission of the possessor of the patent, to commercially produce the article protected by the same, to bring the same on the market, or offer the same for sale. Moreover, if a machine or other manufacturing appliance, a tool or other appliance of labour, or a chemical ingredient forms the subject of the patent, no one is permitted to use the same commercially (or productively) without permission of or license from the owner of the patent.

The patent for a process has the effect that no one is permitted to use the same in a commercial sense without the permission of the owner of the patent.

The patent for a process for the production of an article by chemical means has at the same time, in view of the article, the effects mentioned in paragraph 1, as long as the article is produced according to this process.

Further: If the patent for a chemical article in connection with a process is imparted to its production, then the action of the patent does not extend to the article further than that the same is produced by another process.

Among the consequences which these alterations in the law would give rise to we must mention especially this, that every owner of a patent for a process or for a specified article produced by such process, can prosecute any other person who brings this article into consumption or on the market, who offers it for sale or uses it in course of trade or manufacture, for infringement of his patent, while it becomes obligatory upon this second party to furnish the proof, that this other (second) article is produced by another process. This reversion of the onus of proof which arises herefrom, is naturally of vast improvement for a successful promotion of actions for infringement of patents. The action of the second part of § 4 would also extend to this, that anyone who has acquired an article manufactured abroad according to a patent that has been granted at home, and who has come into possession of the same in an unassailable manner from a manufacturer, may not, for instance, be allowed to use this article for dyeing, inasmuch as this would be an industrial utilisation of the same; while on the other hand, for the sake of argument, the use of a patented illuminant for the lighting of factories would not be touched, as such use although certainly being for "manufacturing purposes," cannot be viewed as "manufacturing" in the spirit of this law.

The commission, moreover, has not been in the dark regarding the difficulties and doubts that would arise in carrying into effect the Caro proposals in the sense above indicated. It next becomes doubtful whether the Patent office will not frequently find themselves in a dilemma as to whether the presumed material is in reality produced by a process described, and furthermore whether a material received is in reality a new material. Both questions can only be finally settled or solved by chemical experiments and analyses, which would inflict upon the Patent office a very considerable amount of labour, which at times would prove almost unsurmountable. Again, we can assume with some degree of probability, that the decisions of the Patent office based upon such analyses, would be subjected frequently to attacks and disputes.

In a later article our contemporary states :—That a great disadvantage of the present process of pleading is that after the refusal of a petition for Letters Patent, the patentee has no opportunity of correcting an error by a fresh draft of the patent deed, so that he can only help himself by an appeal to the Court of Error. By this means unnecessary costs arise, while the capabilities of the patent are often only thoroughly elucidated before the Court of Appeal.

If we reflect for a moment how difficult it frequently is to distinguish a mere idea from a closely allied analogy, and at the same time how differently a discovery is contemplated by various specialists, we can readily understand that the present system of proof must in consequence be subjected to many unjust refusals.

We by no means recommend an entire imitation of the American Patent Laws, which have given rise to no less than three courts of appeal, but an inventor ought at least to be allowed to claim a re-opening of his case in the first court prior to being compelled to enter an appeal before the court of the second instance.

As regards the lapse of a patent through the non-payment of the annual fees, it would certainly be more useful, if the owners of patents were to receive, not immediately *after* the lapse of the patent, but after the lapse of the first terminal, an official note of reminder, and after allowing the first terminal to lapse, they should pay a fine in addition to the regular fee.

Such is the gist of what has lately appeared in the *Chemiker Zeitung*. It is quite certain that our own law will soon have to be revised, and all those interested should keep themselves well posted up in all that is going on, abroad as well as at home.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND CO.

EXPERT EVIDENCE.—*continued.*

MR. WATSON SMITH, sworn. Examined by Mr. Chadwyck Healey :—

You are a Fellow of the Chemical Society, and Lecturer on Chemistry at Owens College, Manchester, I believe?—On Technological Chemistry.

You are also a Fellow of the Institute of Chemistry, and editor of the *Journal of Society of Chemical Industry*?—Yes.

I believe you have read the specification filed under Spence's patent—is that so?—Yes.

Have you heard the evidence that was given by the other witnesses with respect to the sufficiency of the description contained in that specification?—Yes.

Do you or do you not agree with them?—I do agree with them.

What do you say about the novelty of the invention there described. Was it a novel invention or not?—It was a novel invention.

Have you made any experiments by following the directions contained in the specification?—I have.

With what materials have you operated?—With so-called Weldon mud.

Where did you obtain it?—I obtained a portion from Mr. Spence, and another from a specimen that was furnished me from a Widnes Alkali works.

Was the Weldon mud the result of the ordinary manufacture by the Weldon process?—Yes, it was.

Mr. Justice Kekewich: Do you know that?—Yes, I know it.

Mr. Justice Kekewich: How do you know that?—It was a specimen contained in our technological museum, and it was obtained specially—it was asked for as a specimen. And, besides, I am not merely a chemist, I have been a manufacturer as well. I know what Weldon mud is.

Mr. Chadwyck Healey: Do you know what the Weldon mud which you used contained?—Yes.

What was it?—It contained peroxide of manganese, a certain portion of protoxide of manganese, lime, perhaps a trifle of magnesia, alumina, and water.

Having got it, what did you do with the Weldon mud?—I oxidised it.

How?—That is the protoxide that was already contained; I oxidised it by the addition of a little bleaching powder solution.

Is that according to the method described in the specification?—It is.

Was that method known in 1882?—Yes, it was.

Having fully oxidised Weldon mud, what did you do next? I took a portion of it; I took a quantity of alum cake.

How much of each?—I took a proportion of 6 parts of dry peroxide in the Weldon mud to 100 parts of the dry alum cake, and agitated them together, adding the Weldon mud little by little, agitating continually, till at last, all the Weldon mud was added in the manner stated. I then filtered the liquid and found that the iron had been removed. I found that by a chemical test. It had been retained on the filter in the mud.

Did you ascertain how much iron was removed by that experiment?—It was all removed.

Mr. Justice Kekewich: Absolutely all?—Absolutely all.

Mr. Chadwyck Healey: How much iron was there in the sulphate of alumina before you operated upon it?—The sulphate of alumina liquor that was furnished contained 0·4 per cent. of iron, and all that iron was removed by the treatment of the Weldon mud.

Did you make any other experiment?—Yes, I tried later on some experiments qualitatively to ascertain whether an anhydrous peroxide of manganese would answer the purpose—the so-called anhydrous.

What material did you use first?—I prepared a little by the gentle ignition of the nitrate of manganese.

You prepared a little what?—A little anhydrous peroxide of manganese by a method which was reputed to give a pure product. I found that by using larger quantities than were given in the patent it was possible by considerable agitation and standing to remove the iron.

How much did you use of the peroxide which you prepared in that way?—The proportion was a very large one, but I did not dwell very much upon the process because I did not consider it a commercial method. The stuff would be too expensive to use, and I did not go into any very great detail of experiment. I hardly thought it would be a commercial product in any sense of the word. It would be too expensive, and the material would never be a commercial product, it would be too dear.

Is the peroxide of manganese obtainable by that process available for commerce?—No.

Are you able to say what would be the relative cost of preparing peroxide of manganese by that process, and preparing it by the Weldon mud process?—I could not give figures, but the difference would be something very great—such as to put the anhydrous peroxide form completely out of the question.

Do you know that of any anhydrous peroxide of manganese which is chemically as useful as the hydrated peroxide in Weldon mud?—No, I do not know anything so cheap; not in such an available form as that.

Have you made any other experiments in peroxide of manganese for this purpose in either form—anhydrous or hydrated?—Yes, I have used the native manganese? I did that a little while ago.

What ore did you use then?—I used specimens of manganese ore—the hard stuff that is used for generating chlorine in the ordinary manner, first, I got it pulverised in an iron mortar, and then afterwards in an agate mortar, and got it down into a state of subdivision, and applied that as a means of removing iron, and I distinctly removed iron from solution of alumina.

What is the name of that in commerce?—It is called manganese ore—manganese peroxide.

After you had ground it to a fine powder did you treat it in any way before mixing it with the alum solution?—I took some just in the ordinary finely pulverised state, and some I treated with dilute nitric acid. I boiled some to extract other basic substances.

What was the result of the treatment of the nitric acid?—It answered just as well as the other portion untreated.

What effect had the nitric acid upon the peroxide of manganese. What would you treat it with nitric acid for?—To remove the basic substances. Sometimes there is a trifle of carbonate of lime.

Name the substances that you say were present. Do you mean iron, or lime, or magnesia?—Yes, iron would be present: that would have to be removed. I do not say that all the iron is removed. That iron which is in a hard condition in the ore is only partially soluble in such dilute acid; but for the same reason that iron is not introduced into the alum solution it is retained on the filters.

Having treated your peroxide with nitric acid and removed the bases, what had you left?—I had the purified peroxide of manganese. I do not say absolutely pure, but it was pure enough for the purpose.

Substantially pure for commercial purposes?—For that particular purpose.

Was it in an anhydrous or hydrated form?—It was in an anhydrous form.

What did you do with it when you had obtained it in that form?—I treated the sulphate of alumina in solution containing a little iron, first of all the 6 parts. I found the amount was insufficient. By gradually increasing the quantity and giving time, and by considerable agitation, filtration, and so on, I succeeded in extracting all the iron from that alum solution.

What quantity of peroxide of manganese did you use when you extracted the iron?—I daresay 20 per cent.; I cannot say precisely, because I do not consider it a commercial process.

Never mind that. Tell me first what the quantity was?—About 20 per cent., I think, instead of 6 per cent.

Twenty parts to 100 parts?—Yes.

And with those proportions you extracted all the iron in the alum solution?—Yes.

Are those all the experiments which you performed, or have you any more to tell us of. I think I did not ask you about one which you were going on to describe. You say you took some of the peroxide obtained from the natural ore. And you treated it with nitric acid. That is what I understood. Am I right?—Yes.

What did you do with that?—I used it in the same manner, and I found that would answer the purpose of removing the iron.

Did you find any, and if so, what difference in the result of that experiment from the other?—The purpose of the first was a tentative one. The iron that was there might have been in part contained in a form that was soluble in the nitric acid; but it might not be. At all events the nitric acid treatment was adopted. I conclude from the fact that both answered—each as well as the other—that there was no iron soluble in the acid in the first one.

Did you extract as much iron from the alum solution by the one process as you did by the other?—Yes, I did—about the same proportion as nearly as I can judge; but I am only giving you that 20 per cent. as a matter of judgment.

I forget whether I asked you whether you had taken Weldon mud and separated the bases from the peroxide in that case?—In the Weldon mud.

Yes. I have forgotten whether you said that or not. Did you take Weldon mud and by treating it with an acid or in any other way separate the bases from the peroxide?—Yes, I believe I did. It is a long time since I did this experiment—two years ago almost. I am almost sure that I did subject it to a treatment with acid, but at all events I distinctly remember the oxidisation with the bleaching powder.

CROSS-EXAMINED BY MR. LAWSON.

Have you tried the native ore—the pyrolusite?—Not the pyrolusite.

You cannot say whether it acts or not to throw down the iron?—Which, the pyrolusite?

The native manganese—the native peroxide?—It did throw down.

Is it a pure anhydrous peroxide?—No.

What proportion of pure peroxide of manganese does it contain?—That particular sample contained about 64 per cent. of $Mn\ O_2$.

What else was there?—There would be silica—that is equivalent to sand—and a considerable amount of iron, I daresay—oxide of iron.

Is it not quite common to find pyrolusite containing 90 per cent., or nearly 90 per cent.?—Yes; that was not pyrolusite that I used.

What was it?—It was a form that I believe is called manganite.

Does not that contain a lower oxide of manganese?—Yes, it may do that.

It contained a sesquioxide?—It is said to be so.

You know most of these things in chemistry I presume. Is not it a fact that it does contain sesquioxide?—I am speaking of what I know. I know that $Mn\ O_2$ is the substance that generates the chlorine.

Is there not some other lower oxide of manganese in the specimen of ore you speak to?—It may be. I did not test

for that. I tested for manganese peroxide, and I found that amount as tested by the chlorine manufacturer.

You could not say that the action of the minerals you used was due solely to peroxide?—I could say that it is used for that substance that is known in the the trade and by all the manufacturing public as manganese peroxide.

You could not say that the beneficial result you got from this was due solely to the presence of Mn $O_2$?—I think I could by analogy.

You told me there were other substances there. There might have been a lower oxide?—I do not admit the lower oxide; there might have been.

Assuming there were a lower oxide there, would not that have had a beneficial effect in producing the effect you have spoken of?—No, it does not follow.

I will put this to you as a suggestion. Is not it a fact that the action of this peroxide of manganese or the Weldon mud, take it that way, in removing iron from an aluminous solution is due to the presence of the other substances as well as peroxide of manganese?—What other substances?

Weldon mud is not simply pure peroxide of manganese, I understand?—No, it is not.

You said it contained protoxide and lime?—Yes, it contains protoxide and lime.

The iron in the aluminous solution is in what form. It is in the form of sulphate, is it not?—Yes.

Then is not the result which is obtained when the iron is removed a manganite of iron?—I do not like to——

It is a compound of peroxide of manganese with manganite of iron—with oxide of iron?—What you mean is that when the iron is taken down in the process it goes down in the form of manganite of iron?

Yes?—I do not admit that. I am not prepared as chemist to go so far.

Is it a combination of peroxide of manganese with oxide of iron?—It may be what is known as a loose form of combination. It is scarcely that but I have never seen a manganite of iron. I must see that first and compare it myself.

Mr. Justice Kekewich: That is quite right: do not make any assumptions: tell us what you know?

Mr. Lawson: The oxide of iron is there and the peroxide of manganese?—Yes.

And you have the oxide of iron from the sulphate of iron. I understand you to say that in the ultimate result when the iron is thrown down there is something which you will call manganite of iron, but which I believe you admit contains in some form or other peroxide of manganese and oxide of iron?—Yes.

Then to get the oxide of iron you have had to get something from the sulphate of iron. The oxide of iron came from the sulphate of iron, did it not?—Yes, in that solution.

Then the sulphuric acid had to combine with something. Does not that combine either with the alum or with the lower oxide of manganese?—Yes, it is possible—quite.

Is not it the fact that in order to have the iron set free to combine with protoxide you must have in the re-agent that you use something which will combine with sulphuric acid?—Yes, in order to throw that iron down.

Then is not that the process which takes place when you use Weldon mud?—to throw the iron down?—Yes.

Protoxide of manganese or lime, or something of that sort, must be present in order to produce an effectual result, in addition to the pure peroxide?—That does not follow. I do not think it follows. The facts are against it.

But in the case of using ordinary Weldon mud that is what happens?—That may assist, I may say, to some extent.

But in the case of using ordinary Weldon mud, the protoxide of manganese passes into solution?—If it is not fully oxidised—that is to say, If the Weldon mud is not fully oxidised.

Will perfectly pure hydrated peroxide throw down iron from an aluminous solution without the presence of lime or protoxide of manganese, or anything else?—I believe it will, from the experiment I tried. I have never obtained absolutely pure—that is, in the strict chemical sense pure—hydrated peroxide of manganese.

What have been the substances present with it?—I have removed other things which might aid in the way you have described.

What are those other things?—Other things that would act as bases to remove the acid.

What are they?—Lime and protoxide of manganese, as, for example, in Weldon mud, by the addition of bleaching powder.

Can you explain how it is that absolutely pure peroxide throws down the iron?—No, I cannot. I should like to do that; it is very interesting.

Have you made any experiments with the lower oxides—the sesquioxides or any of the intermediate oxides?—No, I should not have thought of doing so, because sesquioxide is not a commercial product. It is not in the market.

Cannot it be made very rapidly by simply heating of peroxide?—Very possibly it may. I did not go into the preparation of those things that are not in the market and are never likely to be.

Mr. Justice Kekewich: And do you mean to say it would not be obtained for the purpose of this specification?—Yes.

Mr. Lawson: Looking at the specification that you have read, is not it a fact that Spence's claim does not relate to any intermediate oxides?

Mr. Justice Kekewich: That is not quite the question to ask him.

Mr. Lawson: Does your Lordship think it is too near the construction?

Mr. Justice Kekewich: It is very difficult to draw the line, even with convenient accuracy; but that is rather over the line, I think. You can easily put it in the proper way.

Mr. Lawson: You see "Manganese combined with oxygen as peroxide"—would that convey to your mind anything but peroxide of manganese?—The phrase "peroxide of manganese" alone, isolated or taken out from this specification, would give me several ideas. It would give me peroxide from a scientific chemical point of view, and also from the manufacturer's point of view, which would be two different things.

It would convey to your mind sesquioxide or lower oxide? No, it would not.

Mr. Justice Kekewich: I do not think now you have got your question answered.

Mr. Lawson: What I wanted Mr. Smith to tell me was whether the expression "manganese combined with oxygen as peroxide," will lead to lower oxides of manganese.

Would those terms lead you to anything else except Mn $O_2$?—It strikes me as referring to Mn $O_2$.

Mr. Justice Kekewich: And nothing else?—No, it is a specific term generally adopted both by manufacturers and scientists.

Mr. Lawson: May I ask your Lordship to stop me if my questions go too far? I should ask him whether the claim contemplates anything beyond peroxide of manganese.

Mr. Justice Kekewich: That is to say, looking at it as a chemist?

Mr. Lawson: Looking at it as a chemist, would you say that this claim contemplates anything beyond peroxide of manganese?—By "the claim" what do you refer to?

The last three lines?—It would strike me as referring to peroxide in an hydrated state.

Why do you say hydrated? Read the claim alone. What is there in the claim to make you say that that is hydrated, confined to hydrated?—"The use of manganese combined with oxygen as peroxide, whether produced from lower oxides by oxidisation, or from manganic acid or their salts by deoxidisation."

Is there anything there to qualify that, to say that peroxide is hydrated?—Is there anything there to show that the peroxide there contemplated must necessarily be hydrated?—At the present moment it does seem to me to indicate that it would be hydrated.

Mr. Justice Kekewich: You say that reading those three and a half lines you understand them to refer to hydrated?—Yes, to hydrated peroxide.

Mr. Justice Kekewich: Kindly give us your reasons for that conclusion; give them in your own language?—The methods, so to say, embodied in this statement give me the impression of wet methods as we call them.

So you tell us; we want to know why that is?—At present no method occurs to me which brings in these conditions by which it can be done in an absolutely dry condition, in which water is entirely absent.

You are well acquainted with Watts' Dictionary of Chemistry?—I do not generally go to it as a technological hand book.

It is a standard book?—Yes.

Mr. Aston: What edition?

Mr. Lawson: This is volume iii. of the edition of 1882, and I will read from page 112. I will read this:—"Peroxide of manganese is prepared by the following processes:—(1) Manganoso-manganic or manganic oxide is boiled in strong nitric acid." Do you know the process?—That is a description of a process, but I do not regard it as a commercial one,

That is not my question. Will that produce hydrated or anhydrous?—What is that?

"Manganoso-manganic or manganic oxide is boiled in strong nitric acid"?—I do not know the process.

I will take another one, "Manganous nitrate is gradually heated to incipient redness, and the residue pounded and freed by boiling nitric acid for any remaining manganous oxide; the insoluble residue is then washed and very carefully heated to low redness, stirring all the while."?—I do not quite see that those are methods——

Mr. Justice Kekewich: Do you know the process?—I have heard of all those processes.

Mr. Lawson: Is not that a mode of oxidation; is not the result of that anhydrous?—Those are methods, but they are not commercial methods; they are only scientific chemists' matters.

Is not that a process of oxidation?—Yes, it seems to me to be so. And will not that process produce anhydrous peroxide?—I have not tried it, so I am not prepared to say. That book says so.

This process was mentioned, I think, by one of the other witnesses. This is Gorgeu's process?—Yes, I have tried that myself.

Is not Gorgeu's process a process of oxidation?—Yes, it is.

Is not the result anhydrous?—The result is not anhydrous.

Then that agrees with this claim?—That is open to a little question. You get a nitrate of manganese first.

Is not Gorgeu's process the obtaining of peroxide of manganese from a lower oxide by oxidisation?—It looks to me like decomposition of a nitrate; it is difficult for me to say that it does.

The decomposition of the nitrate is an intermediate step?—I should not like to say what takes place in the decomposition of the salt. It results in the formation of the anhydrous substance.

Does not the oxidation come from nitric acid?—Yes. I presume it does.

And nitric acid is the commonest oxidising agent, is it not, or a very common oxidising agent?—Yes, it is, but you are not oxidising with nitric acid there.

Mr. Justice Kekewich: In the process, what is the lower oxide?

Mr. Lawson: The protoxide in combination with the nitric acid; I will ask the witness.

Manganese nitrate is a combination of nitric acid and protoxide?—Yes.

Then I may fairly call that a lower oxide?—Yes, it is lower oxide in combination.

"Then I put upon that boiling nitric acid, and I do that for the purpose of oxidising it"?—It appears to me that is unnecessary, but the nitric acid is already combined with the salt. That is complicating a method already simple.

Mr. Justice Kekewich: I suppose this is a matter on which you rely, Mr. Lawson?

Mr. Lawson: Yes.

Mr. Justice Kekewich: You have convinced yourself and me that any opinion that this witness expresses must be purely theoretical; he has not tried it.

Mr. Lawson: If your Lordship pleases, I will merely put these to him.

Now I will take the next one. "Manganous carbonate is heated in an open vessel to 260°, and any portions of carbonate which may then remain undecomposed are removed by cold and very dilute hydrochloric acid, whereupon, according to Forchhammer, pure peroxide remains behind."

Do you know that process?—Yes, I think that is a process followed by Tennant's method.

Is not that a production of peroxide from a lower oxide?—Yes: the decomposition of a salt is involved there.

Does that produce the hydrated or anhydrous?—The high temperature would make it almost anhydrous at all events.

Would you exclude that from this claim—peroxide produced from lower oxides by oxidation—would you exclude this process from the claim?—I do not know that I should.

Now the next process is, "Manganous carbonate is carefully heated with fused chlorate of potassium, and the mass when cold is well washed with water." That is a clear case of oxidation, is it not?—Yes, there is double decomposition there.

But still it is oxidisation?—Oxidisation does take place, certainly.

Then that would be included in this claim?—It might.

Do you know whether the result of that is hydrated or *anhydrous*?—That appears to be anhydrous.

That you think would be in the claim?—It does seem as if it would.

Do not your experiments all show that when you used anhydrous peroxide it would practically be commercially impossible to work the process?—It would not go so far as that.

Supposing it were conceivable that you could not get in any way the Weldon mud, would anybody be able to carry out this process successfully—commercially?—I should not like to say they could not.

In your opinion they could?—I think it is quite possible. It is within the bounds of possibility that they could.

Do you think that it would be a commercial success?—It might be. I do not see any absurdity in the manganese ore being used over again.

No one has ever attempted to do it, I suppose. No one has ever dreamt of using it. I will not say dreamt, but nobody has ever done it?—No, not as far as I know.

In your first experiment you stated that all the iron was removed, and that in the original solution there was ·04 per cent. of iron.

That is a very small proportion, is it not? Is not the usual proportion very much larger than that?—Sometimes.

Nearer a half per cent.?—Yes.

So that in order to get rid of the usual quantity that is present of iron you would have to make those solutions that you used nearly ten times stronger than you did?—Those solutions?

I will not say solutions but agents that you use—the peroxide of manganese. You would have to use ten times the amount of that that you did?—It does not follow. You might give it more time to stand and you might repeat the process little by little.

Do you know of your own knowledge what the effect of pulverising is?—Yes, I do.

What is it?—In this case it increased the activity of the materials. If I took large lumps I could get no action at all.

Would you not have to put in ten times the quantity of peroxide whether it was disintegrated or not?—Yes, if I considered it was a scientifically combined substance.

If you had a solution containing ten times more iron than the solution which you used, that is to say instead of containing ·04 per cent., containing a half per cent., would not you in order to produce the same results, that is to say the complete removal of the iron, have to use ten times the quantity of peroxide?—It would very much depend, if I were a manufacturer, upon what I was working with at the outset. It would all depend upon that.

Using some specimens of peroxide, and taking your experiments—assuming your experiments were made not upon an aluminous solution which contained ·04 per cent. of iron, but upon an aluminous solution containing ·5 (that is to say ten times as much) would not you have had to use ten times the amount of peroxide of manganese that you actually did use in your experiments?—You are referring to the manganese ore experiments are you not?

All your experiments?—It is very difficult to answer that. It depends upon the physical condition.

What I am trying to ask you, if I can make myself sufficiently clear, is this, I understand that you used this aluminous solution containing 0·4 of iron, and you applied peroxides obtained in various ways to that solution, and you obtained certain results?—Yes.

If your solution had been originally ten times as strong would you not have been obliged to treat it with ten times as much peroxide?—You must give me a little time to answer that question. I said everything depends upon the physical condition of the peroxide.

Take the first case. In the first case you used Weldon mud, oxidised by bleaching powder, and you took six parts of dry peroxide to a hundred parts of dry sulphate of alumina. In that solution there was 0·4 per cent of iron. If there had been in the solution ·5 of iron would you not have had to use 60 parts of dry peroxide instead of six?—I am not aware that those alum solutions contain as much iron as that.

I thought you told me just now that you thought you did sometimes. Will you assume that it does contain it?—I do not think it would be fair for me to assume that.

Mr. Justice Kekewich: If you think it is not fair, do not do it.

The Witness: Those alum solutions do not, as a rule, contain so much as that.

Mr. Lawson: What is the greatest amount you have known alum solution contain—the greatest amount of iron?—

Something in the hundreds. I do not think they got into the tenth places in alum solutions.

Your experiment was four hundredths?—Yes, my experiment was.

That is a small amount. Do you know whether there are aluminous solutions in common use which contain a very much larger proportion than that?—That is possible, but they will not be accepted by certain manufacturers.

Supposing those solutions exist, and you want to verify them, would not you have to use a proportionately larger quantity of peroxide?—Yes, a certain proportion. There you might give it longer time. This process I suppose is intended for a weak solution that contains small quantities of iron.

Where does it say so in the specification?—It does not say that in either of the specifications.

Now, I will ask you one or two words about the claim. you know that manganic acid has never been isolated?—No, I have never seen it. It has never been isolated that I am aware of.

Permanganic acid has been isolated has it not?—Not as a chemically pure individual. I could put before you a deep green liquid which has been produced.

Can you produce permanganic acid as a commercial product?—At the present time permanganic acid is not a commercial product that I am aware of.

Supposing it could be done, would it be a commercial process to make peroxide of manganese from manganic acid, as distinguished from its salts?—I could conceive a process in which the peroxide of manganese would be set free, and contained in the mixture but not proved chemically.

If you start from a salt of permanganic acid then you could get peroxide of manganese?—You could obtain peroxide of manganese starting with a salt of a permanganate.

Do you consider that a commercial process?—Yes, permanganate of potash is a commercial product.

Would that be a commercial method of making hydrated peroxide of manganese?—It might be. I could conceive a commercial method based upon the reduction of the permanganate to the peroxide.

Making the peroxide by nitric acid is a well-known method, is it not? Is not that Gorgeu's process?—In a scientific laboratory it is a process for obtaining the pure peroxide; but it is not a well-known method amongst commercial men. It would never be heard of in many of the works' laboratories.

Those processes that I read to you now did not include the use of permanganate as a mode of making peroxide?—Not out of Watts' dictionary as I understood them. I did not gather that that was the case.

Is that method of making the peroxide of manganese from permanganate of potash a well-known process?—Of reducing the permanganate. It is well-known to a certain extent. It is one that would occur more readily.

It was not among those I read to you. Those I read to you are common processes, are they not?—I do not distinctly remember all you did read.

I did not read the permanganate. You would accept Watts' statement as to the ordinary methods as being an authority for saying that those are the ordinary modes?—Yes, scientifically stated.

Then the permanganate process would be an unusual process—not a common process. It is one that would more readily occur?—I do not see the point of the question. It is one that would more readily occur than some of the others in a manufactory.

Did I understand you to say that manganous nitrate would not be a commercial way of getting peroxide of manganese? By heating it.

Yes?—I do not think it would at all.

You think permanganate would be?—It would be much more likely.

Why?—Because permanganates are already in use in the market and are largely used for disinfecting purposes.

RE-EXAMINED BY MR. CHADWYCK HEALEY.

I will read from the book from which my friend Mr. Lawson read: "Peroxide of manganese unites with water in several proportions according to the mode of preparation." Then (*a*) In the spontaneous decomposition of manganates or permanganates"—is that the process to which you refer in making peroxide from permanganate. I will read a little further—"In the spontaneous decomposition of manganates or permanganates dissolved in water or in dilute acid a black brown hydrated peroxide is precipitated which comes to a black coherent mass containing $Mn\ O_2\ H_2\ O$." Is that a process of making peroxide of manganese from permanganates?—I did not hear what you stated it for.

I will read it again "Peroxide of manganese unites with water in several proportions, according to the mode of preparation." That is the preface to the paragraph and then this is one of the subheads: "In the spontaneons decomposition of manganates or permanganates dissolved in water or in dilute acid, a black brown hydrated peroxide is precipitated which comes to a black coherent mass containing $Mn\ O_2\ H_2\ O$," Is that a way of preparing peroxide of manganese from permanganate?—No; that is a spontaneous decomposition, as I understand.

I do not care how it is done; but does peroxide of manganese result from the treatment of a permanganate in some way or another?—Yes, that is so.

Is not that a process for preparing peroxide of manganese? Yes, for chemists; but I am trying to keep in view of manufacturing operations.

Mr. Justice Kekewich: Mr. Smith threw out in all his answers to Mr. Lawson (who I do not think fully appreciated his views) that this was a manufacturer's patent, a process for manufacturers, and that he must regard it entirely as for manufacturers, and without reference to mere scientific experiments. I have understood a great many of his answers to Mr. Lawson as not at all doubting what Mr. Lawson suggested, but as saying that from a manufacturer's point of view it was out of the question.

Mr. Chadwyck Healey: I put the question because I understood or inferred from what my friend said that the process to which the answers referred was not in the book at all. It was my mistake, I daresay.

I suppose I may take it that it is not every alum that must be purified from iron for commercial purposes?—No.

Is it a fact that for some of the arts the fact of it containing a large proportion of iron is not a drawback?—That is so.

But for some other arts, such as calico printing, paper making, or dyeing, you want an alum which is free from iron?—Yes, that is so.

Therefore, a mannfacturer desiring to purify the alum entirely from iron would, I suppose, start with an alum which he has made from better materials, or which was otherwise purer, to begin with?—Yes; he will begin with raw material which is as free as possible from iron. Commercial processes have been tried with materials containing more iron, but they have failed because of the difficulty in removing the iron. Those alums contained a good deal of that material.

Then there may be alums containing a very large per centage of iron which would never be attempted to be made pure?—Yes,

Are you able to say what about is the average impurity in the way of iron contained in what I will call the fine alums, which are intended to be ultimately purified. Tell me if I do not make myself clear?—I see what you mean. Those that are to pass muster as pure alums for calico printers?

Yes?—That would necessitate a large number of analyses on my part which I have not made. I have examined one or two specimens which I have found absolutely free from iron.

Then I will not ask you that, but will get it from another witness. Now I will ask you a question about the lower oxides and their operation in eliminating iron. May I take it that that formula $Mn_2\ O_3$ is one of the lower oxides to which you refer. We have had to-day, I think, in court, a number of formulæ given as representing lower oxides?—It is a lower oxide as regards that which is higher but it is a higher oxide as regards protoxide.

I agree, but suppose it were a lower rather than a higher oxide?—Yes, that is so. I understand.

Now if either of those lower oxides is brought into connection with a solution containing iron impurity are you able to say what takes place? Take first the substance $Mn_2\ O_3$ is the iron then eliminated in any way?—I have not tried $Mn_2\ O_3$.

That may be broken up, may it not, into Mn O and $Mn\ O_2$?—That is a theory which is put forward, but I cannot explain it.

Then if it is only theory I will not ask you any more about it.—I should not like to say anything about any substance which I have not experimented on, and I have not experimented with $Mn_2\ O_3$ or $Mn_3\ O_4$.

Now does your experience enable you to say whether when you have got a very small quantity of iron impurity in the alum solution it requires relatively more or less of the peroxide to remove it—let me put it in another way. You start with an alum solution containing I will say half per cent. of iron. Of course, I know that is an exaggerated amount—and you treat it with peroxide, and you eliminate, say half of that half per cent. by the use of a given quantity

of peroxide. Now, will you want more or less peroxide to remove the remaining quarter per cent.?—You require to increase the quantity.

Then the less the quantity of iron present by way of impurity the greater relative proportion of peroxide must be used. Is that so?—I do not quite see the point of that, the more iron, all things being equal, then the more manganese, but everything depends upon the physical condition of the material taken. As we have seen, there are several forms of Weldon mud. There is then the very hard material, pure peroxide, or certain forms of manganese ore. It entirely depends upon which of those conditions or different things you have to form the manganese,—as to the quantity required. If a certain amount of any of these compounds suitable for the purpose be taken, and very finely pulverised and more time allowed, it will do greater work although you take exactly the same proportion.

That is not quite what I mean. I am afraid I have not made myself quite clear. As you eliminate the iron from the solution do you require more or less proportionately of the peroxide to take out what is left?—I confess I do not quite see the point of that. You have to make a further addition of manganese—if you have got iron left—a certain amount of iron left you have to make a further addition of manganese.

But have you to put in relatively more in the second part than you would in the first?—I have not tried such an experiment as that. I see now what you mean.

Now, I believe you have had experience in bleach works? I have.

Places where peroxide of manganese is either made use of or described from time to time—the expression is used?—Yes, quite so.

And when people engaged in that particular trade make use of the expression "peroxide of manganese," what is understood by it amongst the trade?

Mr. Lawson: Is that re-examination, my lord?

Mr. Justice Kekewich: No, you shall cross-examine upon it. I have given leave to put the question, but you shall have an opportunity of cross-examining upon it.

Mr. Chadwyck Healey: If somebody in that trade makes use of the term peroxide of manganese, what is understood by it in the trade?—I should say manganese ore, as it is used in the trade, by the single word "peroxide."

Mr. Justice Kekewich: Native ore?—By the word alone, I should understand native ore.

Mr. Chadwyck Healey: That is all?—Yes, as a peroxide.

Mr. Justice Kekdwich: He says it means native ore.

The Witness: Yes, just native ore; the one word unqualified. If it was recovered peroxide, it would be another thing.

Mr. Justice Kekewich: Now is the native ore hydrated or anhydrous?

Mr. Chadwyck Healey: I will not ask that, we have been told so often to-day that it is anhydrous.

Does it mean hydrated or anhydrous peroxide?

Mr. Justice Kekewich: Then I do not think you should ask him whether by peroxide is meant hydrated or anhydrous.

Mr. Chadwyck Healey: I will put it in another way. When Weldon mud is used its constituent parts are occasionally mentioned in the bleach works?—Yes.

And one of them is peroxide of manganese?—Peroxide of manganese certainly; but as the work's chemist I should understand the peroxide of manganese to mean $Mn O_2$; that is as a chemist.

Mr. Lawson: I wish merely, upon that, to ask the witness whether he understands the words peroxide of manganese in this specification to include native ore?

The Witness: In both specifications?

No, in Spence's?—The provisional?

Mr. Justice Kekewich: No, the chief thing.

Mr. Lawson: Look at page 2, line 14, "We add to the abovenamed solution in the proportion of six parts of peroxide of manganese," and so on. In your belief does not that word include native ore?—I have to take that word with the context now; it occurs in the context.

Mr. Justice Kekewich: Mr. Lawson calls your attention to that word in the specification with which you are acquainted, and asks you to say whether you understand it as including native ore?—Taken entirely alone, without reading the context. I should say I should take it to mean, from the manufacturer's point of view, native ore.

Native ore only. The question was whether it included native ore?—That would be my first impression, native ore; but as a chemist I should think it would point to the cheapest form of that as Weldon mud. That would be a recovered peroxide.

Mr. Justice Kekewich: You have got that before, at line 9 you find the expression "oxide of manganese;" what does that include?—Speaking again from a manufacturer's point of view, as well as a chemist's, I say that that has a much wider range, and includes the ore as well as the recovered, and all forms of peroxide that are met with in the peroxide.

You say that as a skilled witness. I am asking you only in that character. It covers or means far more—do not let me put words into your mouth—than peroxide of manganese. Do you say so?—Yes, simply taken by itself.

But you can, you see there, take it by itself, as Mr. Lawson says. If you look at those three lines, without reading further for the moment, and clear your mind of everything which follows the full stops—two-thirds along the line 9—you have these words, "Our invention consists in producing alum and other salts of alumina with but a very minute proportion of iron or coloured organic impurity, by digesting or acting upon their solutions with an oxide of manganese." Now I want you to tell me from both a chemical and a manufacturer's point of view, what you say the meaning of "oxide of manganese" is there, supposing that was the whole specification?—That is supposing that I had never seen this before and had nothing more before me at the time.

Yes?—What would pass through my mind would be the one form, because that is the commercial, and it would suggest to me that Weldon mud as also a commercial form of the peroxide.

Anything else?—I do not know that it would go beyond. Those are the two principal forms that would occur to me.

Yes, thank you. Now I want to ask you something else, would you now go to the bottom of the page where you find the words, "the use of manganese combined with oxygen, as peroxide, whether produced" and then follow some words between, "for the purpose of purifying solutions of sulphate or other salts of alumina?"—Yes.

There is an enumeration in that parenthesis—whether complete or not is another question—of the methods of producing the use of manganese combined with oxygen as peroxide. Now just take that, will you—one is from the lower oxides by oxidation?—Yes.

Or from manganic oxide, 2; or permanganic acid, 3; or their salts by deoxidation, 4. Now are there any other means, or is that exhaustive, or is it not?—I think it would be exhaustive.

Does that include, then, the production by the Weldon mud mode?—I think it does.

You think it does. In what particular division—1, 2, 3, or 4—would you include Weldon mud?—It includes Weldon mud, in so far as it is a process of oxidation from a lower to a higher form.

From a lower oxide?—From a lower oxide.

Thank you. I do not know that I have been opening anything at all new. I have been only satisfying my own mind. If I have, you can either of you ask any question upon it.

Mr. Lawson: I do not think I want to ask any question.

Mr. Justice Kekewich: How many more witnesses have you, Mr. Healey? I have three on my list, which your client was kind enough to hand to me.

Mr. Chadwyck Healey: Either three or four, my Lord, I am not sure as to one. I have got the proof, and that is all. I say three or four, but not more than that.

Well, they are all long, are they?—I am afraid they are more or less—not much shorter than Mr. Watson Smith.

Mr. Justice Kekewich: I hope, Mr. Healey, they are as good.

Mr. Chadwyck Healey: As far as I can tell without a rehearsal, they are.

Mr. Justice Kekewich: It is pleasant to have witnesses who are so very careful—who do not volunteer opinions or suggestions, but attend to the questions asked them. It assists the Court very much.

Mr. Chadwyck Healey: Thank you, my lord.

Mr. F. M. Spence was next examined, but as we do not intend to give verbatim reports of any but the scientific evidence, we pass on to Mr. A. Esilman's evidence.

*(To be continued.)*

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Distilling.—We hear that Messrs. Boord and Sons, distillers, have registered the name of their firm as an unlimited company, for the convenience of the partners. No shares will be offered to the public.

## THE TINPLATE TRADE.

A LARGELY attended meeting of tinplate makers was held at the Swansea Exchange on the 10th instant, under the presidency of Mr. James Spence, of London, for the purpose of seeing what steps can be taken with the object of increasing the price of tinplates. The chairman laid before the meeting the basis of a scheme which he stated would meet with the approval of powerful capitalists who are prepared to form a syndicate in furtherance of the object in view. The whole details of the proposals, which took the form of an agreement, were fully and exhaustively discussed, and ultimately a special executive committee was appointed to carry out the decision arrived at. This committee is to put itself in communication with the capitalists already referred to as being ready and willing to co-operate, and to effect an arrangement with the view of immediately putting into practical working shape the scheme proposed to be adopted. One of the principal features of the scheme is the fixing of a *minimum* price for ordinary plates—say B. V. grade at 15s. per box, f. o. b. Swansea—which would be adopted as the figure below which plates for the present should not be sold. The rumour of the intention to form a corner which was current last week evidently had the effect of stiffening the price of tinplates, and it is thought that when the result of yesterday's consultation is made known it will have the effect of further improving both prices and demand. The present moment is regarded as the most favourable part of the year for the purpose of the present combination. At the end of December, 1886, stocks amounted to 311,000 boxes, while last December the stock had been reduced to 207,000 boxes, with the additional fact that stocks of tinplates in America are thoroughly depleted. With this reduction in stocks, notwithstanding the increase of make through additional manufacturing works having been restarted and built, makers expect that the price of plates must keep up, and they look forward to an immediate demand, especially American. Apart from the reduction of stocks the volume of trade is fast overtaking the manufacturing supply. It is stated that the Tin Syndicate is backing the tin-plate makers, and that should any makers be unable to hold their plates sufficiently to obtain the standard price, the members of the syndicate will take the plates on a warrant at a price 1s. below the standard. There are different opinions as to the likelihood of the corner succeeding, for several makers are holding aloof, and there is a feeling that the makers by forming the corner, will be aiding rather the tin corner than themselves. At Redruth tin ticketing on Tuesday, the 10th instant, 161 tons realised £13,154, the highest price obtained being £94. 5s. per ton, which was taken by Wheal Kitty. The average price for the day was £81. 14s. per ton. The quantities for sale were:—Phœnix, 30 tons; Carn Brea, 26; East Pool, 20; Tincroft, 20; Condurrow, 17; South Frances, 13; Tolgullow, 12; West Kitty, 12; Wheal Kitty, 6; Pednandrea, five tons.

## WAGES IN THE NORTH HALF A CENTURY AGO.

A BLUE-BOOK, consisting of 327 folio pages, has just been issued, giving returns of wages between 1830 and 1886 in the various industries of the kingdom. The particulars given will be attractive to all interested in industrial undertakings, but anything like a comprehensive summary of the figures would require much more space than can at present be allotted to the subject. The present average wages in most of our local industries are tolerably well known, and against these may be contrasted the rates current in Newcastle in the year 1834. In a flax spinning factory, girls of from 11 to 12 were paid 2s. to 2s. 6d. per week, young women of 17 and upwards 6s. to 7s., overlookers 25s. to 26s., and boys 3s. to 5s.; while hecklers by piecework earned from 17s. to 25s. per week. The wages of pitmen for the same year are given at 15s. to 20s. a week, with free house and firing; while in the building trade the wages were for carpenters and joiners 18s. to 20s., bricklayers 18s. to 20s,, masons 21s., and slaters 18s. to 24s. The manner of paying Tyne sailors marks the great change which has taken place in the character of the shipping trade. The voyage to London was paid at the rate of £3 between April and October, and £4 between October and April, while in the foreign trade £2 10s. per month was paid for the summer half and £3. 10s. for the winter half. With fair weather and sharp runs, the sailors now and again found themselves favourably placed by the method of taking so much for the voyage, but they were not always into pocket by the bargain, five, six, and seven weeks having sometimes been spent in making the run from the Tyne to the Thames and back. Shipwrights were paid 4s. 6d. per day, keelmen 18s. to 21s. per week; while in miscellaneous trades glassworkers are credited with having earned 25s. to 35s., potters 18s. to 20s., tailors 20s. to 24s., shoemakers 15s. to 18s., weavers 12s., 18s., and 20s., blacksmiths 18s. to 20s., anchorsmiths 20s. to 30s. and 35s., factory labourers 15s., and sawyers—a trade of importance before the days of the steam-saw—21s., or when they worked a full week 30s. per week. The wages of farm servants are returned at £10 to £12 per annum, with board and lodgings; while coalfitters are put down at from £60 to £80 a year. Engineers' wages are not given in the early returns, engineering in these days being in its infancy and as yet unknown as an industry in Newcastle and district.

## THE COPPER SYNDICATE.

THE following has appeared in the *Standard's* city article:—The representative or chief of the French group of speculators engaged in keeping up the copper market is in London. His mission here is reported to be to try and get the Spanish copper companies, the Rio Tinto, the Tharsis, and the Mason and Barry, to enter into a combination for four years not to augment their output of copper. On its part, the syndicate is ready to undertake to buy all the companies' produce at prices which, if they vary with the market, shall be guaranteed not to fall below a certain minimum to be agreed upon—say £60 per ton. This is an ingenious proposal and an impudent one. No company which values its independence is likely to be caught by such a device. The Tharsis Company we have reason to know, will have nothing to do with it, and however anxious the Rio Tinto groups might be to form such a ring, they are bound to fail, even were all the Spanish mines to combine. Do these men really imagine that the mine-owners of the United States, of South Africa, and Australia, and Chili can all be persuaded to enter into a plot to rob their customers? That such a thing as this proposition to the Spanish companies should be thought of by the syndicate is an evidence of weakness. It has managed to buy up Chili bars—a crude, unrefined form of copper, until the price of them is £4 to £5 per ton above that of the pure metal. This latter is usually as much above Chili bars in price as it is now below, so that Chili bars are really £8 to £10 above the price they ought to be at, assuming refined copper to be at its true value. This shows the weakness of the "ring," and helps to explain why it is so anxious to combine with the Spanish companies which produce refined copper.

## COMMERCIAL EDUCATION IN BELGIUM.

MR. GRATTAN, Consul-General at Antwerp, in a report just published by the Foreign Office (Miscellaneous Series No. 76), describes the working of the Institut Supérieur de Commerce of Antwerp, which was founded in 1852, to furnish young men about to enter commercial life with the means of prosecuting a higher range of study than that afforded in the public schools, and to correspond with that given in the Universities in respect of the mathematical and classical curriculum. At the termination of the period of study diplomas are given in the usual way. The College at present contains 150 pupils, a third of whom come from foreign countries. The special character of the instruction is described as "practice combined with theory." Thus if the subject under consideration be sugar or coffee, or some mineral or chemical product, the course of instruction would not only include the commercial operations connected with the purchase or sale of these commodities, but would also embrace a thorough examination into the nature of the product from a scientific point of view, the stipulations of the treaties or tariffs which might affect transactions in each particular branch of trade, etc. An extensive museum of mercantile productions, natural or manufactured, a chemical laboratory, a library comprised of books relating to the subjects treated in the institute, and a numerous collection of geographical and statistical maps form part of the institution. This appears to have been the first establishment which really corresponds to the idea of a commercial University. In the public schools, boys intended for commercial pursuits, commencing from the fourth class upwards, receive special

instruction in commercial subjects; bookkeeping, the elements of commercial law, the history of trade and industry, political economy, industrial and commercial geography, and similar subjects, are successively taught. The fees at the college for the courses are £9 for the first and £11 for the second year. A class for the study of the new language "Volopuk" has been established during the last term as an experiment, and Mr. Grattan understands that it is now taught in the commercial schools of France, Germany, Austria, and Russia. It may be used with advantage, he says, as an addition to the cable code, or for the purposes of telegraphic communication generally. The report, which was compiled for the Imperial Institute, concludes with full details respecting the organisation and courses of instruction derived from the printed reports and prospectuses of the college. The syllabus of the courses of instruction is evidently prepared with great care, and shows very clearly the wide and practical field covered by the students.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

D. D. S.—The almanac is nearly ready, and will be issued in the course of a week. The index is ready but will be sent out with almanac.

H. S.—The ordinary sulphuric acid of commerce, say at 150° Tw., will answer your purpose admirably.

S. S. C.—The arsenic has been stated to be detrimental; but we are doubtful on that point.

D. B.—Your letter must stand over till next week.

G. B.—Your letter has been forwarded.

J. B.—Next week.

A. C. B.—Yes, they will be published, first in this journal, and afterwards as a treatise on the subject.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## ALCOHOLIC POTASH.

*To the Editor of the Chemical Trade Journal.*

Sir,—I am pleased also to add my support to Mr. E. W. T. Jones' and Mr. A. E. Johnson's statement respecting the case of making alcoholic potash which will keep its colour fairly well. I, like Mr. Johnson, buy my "rectified spirit of wine" from my wine merchant, and after saturating with *soda* and distilling, I procure a spirit which, when saturated with potash, keeps its colour for a very long time, many weeks.

May I suggest that Mr. Bell may have used his potash over too many times, and that it is now saturated with impurities.

I am, etc., J. C.

## MARGARINE.

*To the Editor of the Chemical Trade Journal.*

Sir,—There is no doubt but that strenuous efforts will be made to render the recently-made law respecting margarine ineffectual. An acquaintance of mine went into a shop in her neighbourhood, where a large trade in the butter line is carried on among the poor. She asked the shopkeeper why he did not mark the margarine according to the law. He replied that he had the papers marked "Margarine" ready to wrap up the article if anyone asked for it! Surely this is an attempt to keep the law out of sight.—Yours, etc.,

Law.

## CHRISTMAS BOXES.

*To the Editor of the Chemical Trade Journal.*

Sir,—I think it is high time that the chemical trade held a meeting to consider their position with regard to Christmas gifts. This year the tax has been worse than ever, and this system of black-mailing is showing such signs of increased vitality that it would be well if something could be done to stop it forthwith. To hit out straight from the shoulder, I may say that in my own case the "black-mailers" are from the dyers,' printers,' and bleachers' establishments with whom I do a small trade. On Boxing Day in last year, from one dyeing and printing establishment I had no less than five would-be recipients for "New Year gifts," the man who used the chemicals, the storekeeper, the colour mixer, and the two men who "helped to unload," and when I refused to give anything to any one of them, one very significantly remarked, "You may find out you have made a mistake before long." Now, sir, taking the business with this one firm for a whole year, I find my profits on the various transactions have just been £17; now, these men would not have been satisfied with anything less than half a sovereign each, or a tax upon me of nearly 12 per cent.

I should like to ask through the medium of your widely-circulating journal, do the proprietors of the various dyeing, calico printing, and bleaching establishments know to what extent this sort of thing is carried on? If they did, I feel sure that they would endeavour to stop it.

Another instance which happened to me last year will, perhaps, be interesting to your readers. A few days down in the New Year, a colour mixer came to my office and wished to see me, wishing me very politely "a Happy New Year;" his business soon was put forward, and he said that seeing I had secured the contract for such and such chemicals for the coming year, I ought to give him a very handsome "tip." I was rather taken aback by the unblushing coolness of the fellow, and offered him half a sovereign, which he refused to accept, and walked out of the office in disdain. The sequel showed I had acted unwisely if honestly, as throughout the whole year I had constant trouble over my contracts. If this letter serves to bring this matter to the front, I shall be very glad.—I am, etc.,

A Drysalter.

## WATER-GAS.

*To the Editor of the Chemical Trade Journal.*

Sir,—In reply to your correspondent, "Sigma," I have pleasure in appending some particulars as to the cost of producing this gas. The expenses vary, as will be readily understood, and are governed partly by the price of fuel, but more particularly by the scale on which the separation is conducted.

Take a water-gas plant capable of producing 10,000 cubic feet per hour, consisting of one generator, one scrubber, with one gasholder of moderate dimensions. The cost of this plant would be about £1,000, and the cost of the gas produced by the same about as under:—

| | d. | | |
|---|---|---|---|
| Coke for generation, 35,000 cub. ft. per ton, at 8s. per ton, = ..... | 2·74 | per 1,000 cub. ft. | |
| Evaporation of water ..... | 0·09 | ,, | ,, |
| Water ..... | 0·02 | ,, | ,, |
| Labour ..... | 1·00 | ,, | ,, |
| Interest and depreciation ..... | 0·30 | ,, | ,, |
| Repairs and stores ..... | 0·15 | ,, | ,, |
| | 4·30 | | |

This equals about 4½d. per 1,000 cubic feet; but such portion of the gas as was used for illuminating purposes would have to be purified after the manner of ordinary gasworks practice, which usually costs less than one penny per 1,000 cubic feet, and the cost of the gas, therefore, made on this scale, might be put down at 6d. per 1,000 cubic feet in the holder.

At present the Fahnehjelm magnesia combs, by which a beautiful incandescent light is produced with this gas, cost 1½d. each, and this adds from 3d. to 6d. per 1,000 cubic feet to the cost of the gas for lighting purposes, bringing it up to say 10d.

If the operation is conducted altogether on a smaller scale, the cost runs a little higher, as might naturally be expected, the figures varying according to the conditions of each installation, and due to the fact that in small plants the cost of labour is sometimes almost eliminated, because one is only occupied for an hour or two per day in gas making, man's time, whilst on the other hand the smaller the make the higher the fixed charges for interest and depreciation, and the consumption of fuel rather larger in proportion to the gas made.

Under the most adverse conditions in these respects, the gas when made on a small scale may run up to a maximum of say 1s. per 1,000 cubic feet in the holder.—I am, etc.,

A. Wilson.

Lead Poisoning.—The Sheffield Corporation, which has just taken over the water supply of the town, is called upon to deal with an epidemic of lead poisoning that is very prevalent in some of the high-lying districts of the borough. Sheffield is supplied with water from two sources, and it has been proved that with regard to one of them there are certain vegetable acids in the water which take up lead, and render the water to some extent poisonous.

# Trade Notes.

ESSRS. SPENCE'S PATENT.—We have been asked to e that Messrs. Peter Spence and Sons are taking steps to ify the technical error in the complete specification of r patent, for purifying alum solutions from iron, by the al process of disclaimer.

ORKSHIRE MINERS AND THEIR WAGES.—The Yorkshire l owners met at Sheffield recently to consider the nand of the miners for an advance of 10 % on their wages l the formation of a Board of Conciliation. The advance s asked for on the ground that coal had been raised in rkshire and Lincolnshire. The coal owners refused the uest on the ground that increased wages were unwarran- by the present price of coal. They denied that prices re higher in Yorkshire, and the advance in Lancashire s the ordinary winter rise. They expressed themselves lling to join with the Board of Conciliation for the settle- nt of wages disputes whenever the miners' representatives re willing to agree to an equitable sliding scale.

SAFETY LAMPS.—The strike of miners at Messrs. Cross, tley, and Co.'s Main Colliery, near Wigan, which com- nced on the 30th ult., owing to the introduction of a new mp, terminated recently. It has been agreed that the wy lamp shall be used as formerly, until other arrange- nts can be mutually agreed upon.

NEW TINPLATE WORKS AT BRITON FERRY.—Operations re commenced at Briton Ferry on Wednesday, the 10th stant, in connection with the erection of the proposed tin- ate works by the Victoria Tinplate Company. The site is every respect an excellent one. It is expected that the rk of building will be proceeded with very shortly.

TIN.—The following monthly statistical return shows the ndition of supplies and deliveries for the last two years:—

| | 1887. 30th Nov. | 1887. 31st Dec. | 1886. 31st Dec. |
|---|---|---|---|
| raits and Australian spot, landing, afloat, and on warrants ... ... ... | 12,515 ..... | 15,006 ..... | 8,459 |
| ocks—America ... ... ... ... ... | 2,030 ..... | 1,570 ..... | 3,780 |
| ice ... ... ... ... ... ... ... ... | £165 ..... | £167 ..... | £99 10s. |
| liveries ... ... ... ... ... ... | 1,221 ..... | 899 ..... | 1,684 |

om the foregoing statement it will be seen that consump- n of tin is undoubtedly decreasing, as deliveries for cember evidently prove.

INCREASED OUTPUT OF STRAITS TIN.—The following ter has been sent to a firm in Birmingham by its Singapore respondent, and tends to show that a largely-increased put of Straits tin has resulted:—"The high prices have the effect of increasing largely the output. The Chinese es are working day and night, and stocks are accumulating. nay be interesting for you to know that the actual cost of is at the most $24 per picul (say at 3s. 2¾d. per dollar, 136lb. per picul), £63 per ton; thus the Chinese have ntly reaped a rich harvest from the present high prices ng in Europe. We enclose a *pro forma* invoice at $28 per l, or 16⅔ per cent. increase on cost price, showing total laid down in London for 50 tons would be about £78 per

NTHRACITE COAL TRADE.—Anthracite nut coal at present n good demand in France, in the Baltic, and Central erica. The increased demand for anthracite coal broken ut size has been particularly felt for some time back, and nas led anthracite owners to put up coal-breaking chines for the purpose of reducing the size of the coal, as by the collier, to about the size of an egg, in imitation of plan adopted by American anthracite owners. It is ewhat doubtful whether this coal-breaking process will ceed, as the waste caused by the coal crusher is so ous, and the small it produces contains such a large pro- tion of dust, which is almost useless.

LONDON'S COAL.—Last year there was sent to London—or her to the metroplitan area—rather more than 12,000,000 s of coal. Newcastle, Sunderland, West Hartlepool, and ham sent by sea 3,600,000 tons of this, so, that with the l-borne coal from Durham, a large proportion of the coal sumed in the metropolis is from the Northern coal-field.

SCOTCH COAL FOR THE ADMIRALTY.—Referring to the stion of the suitability of Scotch Coal for Her Majesty's ps, we understand the Slamannan coalmasters have chosen following coals, as typical of the production of that trict, for the trials which are about to be made at Ports- uth:—Arden and Stanrigg (Wm. Black & Sons), Longrigg d Longriggend (James Nimmo & Co.), West Longrigg mes Gemmell).

BRICKLAYING IN FROSTY WEATHER.—A report just issued by the Foreign Office (Miscellaneous Series, No. 75) deals with a subject of much interest to the building trades of this country—viz., the method by which bricklayers' work is carried on in winter in Norway. Mr. Michell, the Consul-General at Christiania, having noticed extensive building operations in the coldest weather, invited Mr. Due, "an architect of the first eminence in this capital," to explain why Norwegian builders did not suspend their work on the appearance of frost like those of Great Britain. Mr. Due states that for twelve years past, winter has caused no cessation in work; the principal railway station, several public schools, a number of large mansions, clubs, business premises, and private residences having been partly built during winter.

THE UNITED STATES POPULATION.—In his address to the "Cattle Kings" at Chicago, the Commissioner of Agriculture is reported to have said:—"In 1880 we had 50,000,000 of inhabitants; in 1905, we should have 100,000,000; in 1930, 200,000,000; in 1955, 400,000,000; in 1980, less than 100 years hence, 800,000,000 of inhabitants. Where are these teeming millions to live? On what are they to subsist? Where and how are the cattle to be bred and reared that must be relied upon to furnish beef?"

FRENCH BRANDY.—Now that butter has an Act of Parliament all to itself, it might not be injudicious to look a little into the question of French brandy. According to the British Vice-Consul at La Rochelle, "pure brandy has become very scarce, most of what is sold being mixed with beetroot or cheap German spirit." Further on, he proceeds: "It has come to my knowledge that extensive frauds are being carried on at the expense of English buyers of French brandy. . . . . by sending over from this country, as cognac, spirits of an inferior and unwholesome kind made from potatoes in Germany." The plan by which this imposture is perpetrated is for a firm engaged in the brandy trade in London to have a branch house or a representative at Hamburg, and to ship the German spirit, not direct to England, but to Bordeaux, or some other French seaport, whence it is sent duly labelled French cognac to the shores of Great Britain. The British Vice-Consul at La Rochelle is not the first who has turned his attention to this department of commercial deceit, his statement having already been corroborated in sundry other quarters. Our margarine form of brandy clearly requires a closer investigation than it has received.

THE QUALITY OF GAS AT HEXHAM.—On Tuesday, at the meeting of the Hexham Local Board, the chairman (Mr. James T. Robb) said that the Gas Company, owing to numerous complaints being made to them as to the quality of the gas, considered it their duty to call in Mr. John Pattinson, analyst, Newcastle, to examine the gas as to its quality and illuminating power. Mr. Pattinson reported that he found the illuminating power to be equal to 16·4 standard sperm candles. The gas was quite free from sulphuretted hydrogen.—Mr. J. T. Trotter said the gas had certainly a bad smell for a fortnight prior to last week.—The chairman: They put a fresh purifier in before Mr. Pattinson came.—Mr. G. F. Hedley: That would make the difference.

ALCOHOL.—Not before time, the French Government, perceiving the danger to an important industry and to the health of the inhabitants, has decided to take action against the adulteration of brandy and other spirituous liquors. A Commission of Inquiry, consisting of distinguished members of the Academy of Sciences, is being organised to assist the Government; and a prize of 50,000 francs is offered to anyone finding out the best method whereby to tell exactly and without difficulty of manipulation, whether there are present in a liquor other alcohols besides Ethyl alcohol (common alcohol or spirits of wine).

PHOTOGRAPHING RIFLE BULLETS as they rush through the air with a velocity of from 440 to 450 yards a second is the feat accomplished by two Austrian captains, Mach and Salcher. This delicate operation is accomplished by the help of an induction spark flashed by the bullet at the moment of its passing within the compass of the photographic apparatus. In this way a picture is got not only of the projectile but also of the air-waves that accompany it, the one compressed, the other dilated. The latter, which is conical-shaped, is behind the bullet; the former, which is in advance, has the outline of a parabola. The bullets used are of the elongated kind. The latest experiments made by Captains Mach and Salcher are described as the most successful yet attempted.

The Cultivation of Tobacco in the United States.—The *Economiste Français* publishes the following table showing the total quantity of tobacco manufactured in and exported from the United States during the last seven years :—

| Year. | Tobaccos manufactured. | Tobaccos exported. | Total. |
|---|---|---|---|
| | lb. | lb. | lb. |
| 1880-81 ... ... ... ... ... | 207,094,752 ... | 227,026,605 ... | 434,121,357 |
| 1881-82 ... ... ... ... ... | 236,504,292 ... | 223,665,980 ... | 460,170,272 |
| 1882-83 ... ... ... ... ... | 232,218,885 ... | 235,628,360 ... | 467,847,245 |
| 1883-84 ... ... ... ... ... | 265,479,461 ... | 192,130,820 ... | 457,610,281 |
| 1884-85 ... ... ... ... ... | 242,215,634 ... | 219,221,207 ... | 461,436,841 |
| 1885-86 ... ... ... ... ... | 270,813,795 ... | 281,737,120 ... | 552,550,915 |
| 1886-87 ... ... ... ... ... | 276,076,311 ... | 293,666,990 ... | 569,743,304 |
| Average for the seven years | 247,200,477 ... | 239,011,012 ... | 486,211,459 |

The Norwegian Fisheries in 1887.—According to a report by Mr. Gade, the United States Consul at Bergen, the Lofoten fisheries, which are the principal in Norway, were hindered by heavy gales in the early spring; subsequently there was some improvement, so that on April 10th, when the season closed, 31 million cod was given as the total catch, 24,250,000 were cured (salted), and the remainder dried for stock fish. The other products of the catch are estimated at 9,500 barrels of steam-refined medicine oil, 16,600 barrels of other oils of inferior qualities, the product of 41,450 barrels of liver and 31,450 barrels of fish roe, making a total value of about £270,000, which is nearly 15 per cent below the average proceeds for the past ten years.

Honours for a Manchester Lecturer.—We are pleased to notice that the vacant Chair of Chemistry, in the University College of Wales, Aberystwith, has been filled by the election of Dr. H. Lloyd Snape, who has until recently filled the Chair of Chemistry at the Manchester Technical School.

Increased Production of Basic Steel.—Official returns were issued on Saturday last showing the production of basic steel on the Continent and in this country during the twelve months ending October 30th last. The total make of the twelve months was 1,702,252 tons, being an increase on the year of 388,621 tons. Of this make no fewer than 1,222,732 tons were ingot iron containing under 0·17 per cent. of carbon, which is high testimony to the value of the material produced. The total production in England was 364,526 tons, an increase of 106,060 tons upon the twelve months; and of this aggregate 233,358 tons contained under 1·17 per cent. of carbon. The total continental make was 1,337,726 tons, an increase over the year of 282,561 tons. The respective continental countries and their makes were:—Germany, Luxemberg, and Austria (combined) 1,102,496 tons, an increase on the year of 218,637 tons; France, 174,271 tons—an increase of 51,560 tons; and Belgium and other countries, 60,959 tons—an increase of 12,864 tons.

Cognac.—There are others besides the French Government having good grounds for looking after the foreign brandy business. There are not many businesses more deservedly called corrupt than this one has become; and if the British public knew the constituents of much of the vile stuff now sold under the name of brandy, rather than take it for a beverage or medicament they would swallow croton oil or devil's bitters. If any one doubt this, let him peruse the report of Mr. Warburton, British Vice-Consul at La Rochelle, lately issued from the Foreign Office.

Gas Tubes.—At a meeting of the English Tube Association held last week, it was resolved to reduce the discount on galvanised malleable iron tubes for gas purposes by 2½ per cent., which makes the combination terms 60 per cent. off the list. It is anticipated that the Scotch makers will speedily follow suit.

The Trade of Seaham Harbour in 1887.—The shipments of coal at the port of Seaham Harbour during 1887 were 724,064 tons, and those of coke 289 tons, making a total of 724,353 tons. This quantity has been shipped in 2,079 vessels, of which 704 were steamers. There have also been imported 46,701 dozen props and crown trees, 5,520 pieces of chalk, 646 loads of timber, and 313 tons of hay and straw. The collieries in the district have had very little broken time during the year. The Seaham Chemical Works are about to be restarted.

The Flameless Explosives Company Limited, has been formed of the purchase from Herr Hermann, Schoenewig, of the patent rights of the United Kingdom, India, the Colonies, and British posessions, of a process which renders absolutely flameless, dynamite blasting-gelatine, and other dangerous explosives, and at the same time materially reduces their cost. They propose also to secure the rights for the new explosive known as Securite. The capital of the company is £150,000 in 150,000 shares of £1 each.

Poisoned by Coal-Gas.—Mr. Langham, coroner for the City of London and Duchy of Lancaster, held an inquiry on Friday, the 13th inst., regarding the death of Mr. William Thomas Manning, aged 61, coroner to the Queen's Household. The deceased lived at The Old Farm, New-park-road, Clapham-park, Brixton, and had been for many years Queen's coroner. Last Sunday, during the night, there was an escape of gas in an apartment under Mr. Manning's bedroom, which it filled. Mr. Manning was discovered lying on the bed insensible, and, although efforts were made to restore him, he died on Tuesday in consequence of the inhalation. The jury returned a verdict of "Accidental death."

German Trade and English Bankers.—In a recent report the United States Consul-General at Berlin, refers to the demand of German commercial men for banks of their own in foreign countries. The emancipation of German trade, he says, from the agency of English bankers is regarded as one of the expedients for promoting German exports. It is computed that English banking houses derive from transmarine trade six milliards of marks per annum (300 millions sterling), of which German commerce bears a considerable share. Nearly the whole import of raw material from Asia, Africa, and Australia, is carried on through English agents, while imports from South America chiefly feed agents at Havre and Antwerp. Of cotton alone in 1885 Germany imported 4,207,700 kilos through Austria-Hungary, through Italy 6,017,300, through Switzerland 398,500, France 6,924,200, Belgium 36,808,900, the Netherlands 9,684,000, and Great Britain 21,651,000; of wool she imported 27,381,700 kilos through Belgium, and 21,994,000 through Great Britain. It is intended, therefore, to procure for German commerce the negotiation of drafts on Germany in transmarine markets; and by the establishment of a colonial bank, empowered to do all ordinary banking business, and with branches abroad, to secure for German trade direct banking facilities between home and the various centres of German trade abroad, without the intervention of English banks.

Blast Furnaces.—The number of furnaces in blast on the 31st December, was 283 in England, 37 in Wales, and 84 in Scotland, in all 404, as compared with a total of 405 on 31st March last. There are at present 4 furnaces being built, and 5 rebuilt in England.

Extensive Blasting Operations in Furness.—On Saturday afternoon, the 14th inst., very extensive blasting operations were carried out at Goldmire, a limestone quarry about three miles from Barrow, the property of the Askam and Mouzell Iron Company. It has been usual to have a large blast once every two years. The last one was in 1886, when nearly three tons of gunpowder, divided into two portions, was the means of bringing down nearly 30,000 tons of limestone. The manager, Mr. A. Barrow, determined that the charge for the blast which took place on Saturday the 14th inst., should not be divided, as before, but placed in one chamber in order to gain greater results from the explosion. A hole 40ft. long was driven into the face of the rock, and 126ft. from the surface. A chamber was here formed somewhat in the shape of a decanter or bottle, and into this, nearly four tons of coarse blasting powder was placed. An electric fuse was placed in the hole, and ten minutes after it had been ignited there was a tremendous report, the whole face of the rock being brought down with a terrific roar, and crumbling into comparatively small pieces, It was estimated that about 40,000 tons of rock had been dislodged.

Bass, Ratcliffe and Gretton.—The Central News says: In the *London Gazette* last week it is officially notified that an extraordinary meeting of Bass, Ratcliffe, and Gretton Limited, held at Burton-on-Trent on December 23rd, a special resolution was passed, confirmed subsequently at an extraordinary general meeting, for the voluntary winding-up of the firm. Lord Burton, Richard Ratcliffe, John Gretton, Robert Ratcliffe, and John Clay are appointed liquidators for the winding-up. It is reported that the winding-up of this great brewery firm, which is the largest in the world, has been effected in order that the business may be turned into a limited liability company, the shares being offered for public subscription. It is rumoured that the capital to be asked will amount to either £10,000,000 or £12,000,000. The result of the alteration will be that the concern will be changed from a private to a public limited liability company.

**£1,546,318,920,731,927.238,932.**—If anybody would like to know the amount of £1 laid up at 5 per cent. compound interest for a thousand years, let him or her consult Mr. Sydney Lupton's article in last week's *Nature*. He gives the amount as £1,546,318,920,731,927,238,982.

BULLER AND BASSET TIN AND COPPER COMPANY ED, has been formed with a capital of £100,000 in o shares of £1 each, for the purpose of acquiring as a concern the mining of Wheal Buller, Copper Hill, and Basset, the lands of Major-General Sir Redvers Buller, provide capital for developing the mines, and working dies of ore already opened out and proven. These ties are adjacent to the town of Redruth, in Cornwall. romoters anticipate the working of the mines will very profitable to the company.

HINERY ACCIDENT AT STRATFORD.—Charles Perry, twenty, was working at Howard's Chemical Works, ord, East London, on Saturday, when his clothes e entangled in the machinery, and he was drawn into e was terribly injured, and died shortly after admis- the London Hospital.

D POISONING IN SHEFFIELD.—Much anxiety is felt in ld in consequence of the Redmires portion of the supply having been found to cause lead poisoning. of cases are known to exist, and a leading physician town states in the press, that the matter cannot be o strongly, for in the long run it will shorten if not y as many lives as small-pox. Several families have o the south on account of the new epidemic. The n analyst, Mr. A. H. Allen, has samples of water from ected districts continually being sent to him, and he bly discovers lead present in some degree. A number ths are stated to have occurred, and a fatal case was ed yesterday.

BABLE RE-OPENING OF A SUGAR WORKS.—If the rise r values continues we hear it is the intention to re- he large sugar factory at Silvertown at an early date.

GARINE.—The demand for margarine continues as as ever, with an advance in price for oleo-margarine, erefore a rise in quotations for the finished product. the new Act has in no wise diminished the consump- hough it may have lessened profits in individual es. Arrivals of margarine for the week via Hull, packages, or 208 tons; and via Grimsby, 12,764 es, or 206 tons. Manufacturers anticipating a lessened d have shipped 200 tons less than the previous week. be most interesting to watch the developments for the few weeks, which will virtually decide what position mmodity will take permanently in the trade. Our inion is, that in the long run the trade will run in the oves.

LAR LECTURE.—On the 12th inst., at the Primrose West Silvertown, Mr. S. P. Eastick, assisted by his , gave a very interesting lecture on "Light." The al experiments included demonstrations of the candle, ps, and the magnesium light; electricity, both as glow and arc-light, being illustrated by diagrams. At the sion a vote of thanks was proposed to the lecturer rried with acclamation.

MAN MINERAL WATER MANUFACTURE.—The police ment has obtained the consent of the Berlin magistracy e the following order:—(1.) The buildings in which al mineral waters are produced, must be well ventilated acious, and sufficiently well lighted, that all the tus erected therein can be examined in all their e parts. (2.) The use of spring water is forbidden. lts used in the manufacture must possess the chemical prescribed by the pharmacopæa. The order also s the following clause for the protection of the work- -The bottles filled with the carbonic acid water must ered with safety baskets made of strong woven wire, suitable protecting spectacles must be worn. The of this order is threatened with a fine of M. 6 (£3), or sponding term of imprisonment.—*Chemiker Zeitung.*

# Queries and Replies.

TING MINERAL OILS.—The only way to get a satis- test of oils for lubricating purposes is by the use of chanical test. There is no chemical test which is e.—ANOTHER ENGINEER.

H.—This article may be burned and used as fuel in a milar burner to Harrison Blair's sulphur burner, but stocked" will find that pitch burning is not by any an easy task.—ONE WHO HAS TRIED.

HYLAMINE.—I have heard that this substance is being n large quantities by distilling the waste liquor from boiling. Can you or any of your readers say where de?—A USER OF FINE CHEMICALS.

PYRIDINE.—Your correspondent, "A Tar Distiller," must not think he has an El Dorado in pyridine; there is only a fraction of a gallon to be obtained from one ton of tar; and now that the price is falling it is a question whether the game is worth the candle.—SIGMA.

AMMONIA CARBONATE.—Can any of your readers tell me how carbonate of ammonia is made on the large scale. I do not mean how books say it is made, but how it is actually produced.—INVENTOR.

NICKEL ORE.—Where could I sell an ore containing 3 to 4 per cent. of nickel and 36 per cent. of sulphur?—MINER.

MANGANESE ORE.—Is there any outlet for an ore containing 30 per cent. of peroxide?—MINER.

## RHODAMIN.

UNDER this name the Badische Anilin and Soda Fabrik has just brought into the market a new colouring matter, which it is presumed will in a short time meet with an extended application, in the dyeing as well as the calico printing industries.

Rhodamin is of a basic nature, and can be used for silks as well as for woollen and cotton fabrics. The finer shades possess a marvellous delicacy and purity, while the heavier ones attain a fire and beauty hitherto unknown amongst existing colouring materials. In addition to these qualities, it posseses the excellent attribute of being unacted upon by the air and light, and so does not fade as many other colouring matters unfortunately do, which are also noted for their beauty and brightness.

Rhodamin has already found its way into various processes of printing, more especially of finer woollen fabrics. The merchantable product consists of the hydrochlorate of the base; it is in the form of a reddish-brown powder, which is soluble with the greatest facility in water and alcohol. Diluted solutions show a most magnificent fluorescence, which disappears on being heated, regaining this property again on cooling.

Solutions of moderate concentration are decomposed by soda setting the base free, which is deposited in almost colourless flakes, and when exposed to the air become rapidly coloured red through the absorption of carbonic acid. The free base is soluble in alcohol, ether, and chloroform.

The substance dissolves in concentrated sulphuric acid with the formation of a yellowish solution, which upon dilution with water again passes into a red. By means of reducing agents it becomes colourless, and the solution upon exposure to the air again is gradually oxidised.

## CHILIAN MANGANESE.

MANGANESE ore has lately been discovered and worked in Chili, and owing to inquiries made by the Government of the United States, some idea may be gained of the extent and future of this industry. The ore is generally found spread over immense areas. Some nine or ten years ago several workings were opened near the Hospital Station on the Chilian Southern Railway, at a village called Mansel, but were eventually given up as unprofitable.

Other workings were then commenced in the Province of Coquimbo, by Messrs. Guill, Tripler, and Company, but the quality of the ore was not good, as it varied between 35 and 40 per cent., and though a railway exists to these mines at Corral, Quemado, and Fragua, yet the industry has not made much headway. The mines at Leoncito and Arrayan are reported to be busy yielding ores of 45 to 50 per cent., of which quality some 3,000 to 4,000 tons are monthly shipped to England. Most of the ores are highly siliceous, containing about 15 per cent. of silica, while the amount of phosphorus varies from 0·10 to 0·15 per cent.

North of Coquimbo, at Porvenir, and Mirador, in the Province of Atacama, other important mines exist, wherefrom is raised ore of very good quality, often containing over 56 per cent., with copper in but minute traces, and phosphorus about 0·10 per cent. At the present time about 1,000 tons per month are raised, but an intended railway seems to promise that soon over 4,000 tons will be the monthly output. The projected railway, it is anticipated, will cut down the cost of carriage to nearly one-half of the present charges, or from 9 pesos (33s. 9d.) to 5 pesos (18s. 9d.) per ton. The estimated cost of the line is from 40,000 to 50,000 pesos (£7,500 to £9,375).

## GERMAN PATENT LAW.

THE *Chemiker Zeitung* says:—The National Court has now firmly laid down the important principle that a nullity plaintiff nonsuited, after a judgment against him has become legally confirmed cannot repeat the plaint of nullity—not even in the face of further materials of proof.

In the case in question the Patent office had only partially met a nullity plaint, inasmuch, as though it limited the claim of the patent assailed, it still permitted the patent in other respects to remain intact. The nullity claimant, after this decision had become law, repeated the claim for a complete destruction of the patent, and he supported his plaint upon American patent office documents, which only subsequently had become known to him. The Patent office had, in face of the fresh material met the proposal to its full extent.

Upon a motion made by the defendant, the Imperial Court has reversed the decision of the Patent office on the ground that it cannot be conceded to the nullity claimant after the novelty has once been decided against him—for him to come again with fresh assumptions of other anticipations in order to once again combat the same discovery. Moreover, in the nullity proceedings, he is compelled to cite the *entire material* from which he believes he is able to set aside the patent. If he has omitted to take cognisance of anything that has been published in the public prints or publicly announced, then it is his own loss.

Naturally, this decision does not prejudice other persons who subsequently desire to assail the patent on the ground of the fresh material of proof.

## MANURING THE PEACH.

THE value of muriate of potash and fine ground bone as a preventative against the yellows has come to be generally recognised by peach growers since the results of such treatment at the Massachusetts Agricultural College were made public by Profs. Goessmann and Maynard. The report of the New Jersey experiment station for the past year contains an account of an investigation of the peach orchards of that State that bear out the results above referred to. There is ample proof that those who cultivate the most thoroughly and fertilise the most judiciously realise the greatest profits in peach growing. The healthiest and longest-lived orchards in New Jersey are those which have been fertilised with potash and phosphoric acid in some form, and those who have used these fertilisers are generally intending to use them again, while those who have only used yard manure or nothing are looking for something better. In setting an orchard care is taken to throw out any tree that looks diseased; and if the yellows appear in a few trees they are at once rooted out and burned. One orchard that had received bone and potash for four years was seeded to clover for one year, and then ploughed under after a top dressing of lime, with a satisfactory renewal of thrift on the part of the old trees.

Many cultivators do not rightly discriminate between the yellows and the effect of the borer, attributing the effects of the one to the other. Some of the sure indications of yellows are the dying of the twigs, a rough, prickly bark along the limbs, and premature ripening of the fruit, which usually has a red flesh and a bitter taste. The borers' work is usually shown by a gummy substance or castings at the base of the tree at the surface of the ground, and by yellow leaves when their work is carried to any extent. The remedy for borers is to dig them out with a sharp knife in June and August.—*Rural Californian*.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

THERE is very little of change to report. Inquiry has been a shade weaker, but not to the mark of affecting prices as yet. Makers of bleaching powder are sending out rather a lessened bulk, but their quotations remain intact, or nearly so. Sulphate of ammonia holds mark of last week, namely, £13, and although higher prices have been spoken of, on diligent inquiry it does not appear that business has been carried at any time over the figure here set down, although there may, perhaps, have been one or two transactions at a fraction below it. This section of the market is puzzling the Scotch dealers a good deal, and some of them confess candidly their total inability to make head or tail of the immediate future. To almost all of them the late phenomenal rise was quite unlooked for. The market is very sensitive, and now being the time of the greatest annual consumption, the slightest increase in the current of orders within the next week or two, would certainly send ammonia up over the £13. Paraffin chemicals are all the turning easier, except burning oil, which, owing to temporary scarcity, is done here and there as high as 7½d. Bichromates have passed through a week of singular neglect, the full booking of one large works barely touching 10 tons. Chief prices current are:—Soda crystals, 41s. 6d. net Tyne; alum £5, less 2½ % Glasgow; borax, English refined, £31, and boraic acid £46 net Glasgow; soda-ash, 48/52°, 1d. less 5 % Tyne; caustic soda, white, 76°, £8. 5s., 70/72°, £7, 60/62°, £6. 1s. 3d., and cream, 60/62°, £6. 1s. 3d., less 2½ % Liverpool; bicarbonate of soda, 5cwt. casks, £5. 15s., and 1 cwt. casks £6 net Tyne; refined alkali, 48/52°, 1½d. less 2½ % Tyne; saltcake, 21s. 6d. less 2½ % f.o.r. Glasgow; bleaching powder, £7. 17s. 6d. less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d. less 5 % and 6 % to Scotch and English respectively; nitrate of soda, 9s. 6d. to 9s. 9d.; chlorate of potash, 6½d. less 5 % any port; sulphate of ammonia, £13 f.o.b. Leith; paraffin scale, hard, 2½d. and soft, 2d.; paraffin wax, 120°, semi-refined, 3d., and re-melted, 2¼d.; paraffin spirit, 6d.; burning oil, 6d. to 7½d.; lubricating oil, 885°, £6. 10s. to £7.; sulphate of copper, £21. Week's imports include, of sugar, 15,910 bags and 10,383 baskets; 3,779 barrels resin; 13,181 tons iron ore; and 1,113 tons pyrites.

## THE LIVERPOOL MINERAL MARKET.

THE market during the past week has continued fairly active. Manganese: more arrivals, but prices are practically unaltered. Magnesite (containing 98 % of carbonate of magnesia): Stocks are lower, but prices are unchanged at 30s. to 35s. for raw lump; and calcined ground £10 to £11. Bauxite (Irish Hill Brand) continues in demand at 20s. for lump; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals continue small, and, although more sales have been made, prices are without change—80s. to 85s. for medium. Barytes (carbonate): Best quality particularly continues scarce, and prices are firm. Selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate unchanged; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-stone: Fair demand for good qualities; ground, £6. 10s. to £7. Iron ore stronger. Bilbao and Santander, 7s. 6d.; Irish, 10s. Purple ore, 6s. Emerystone moves slowly at £5. 5s. to £5. 15s. for lump; smalls, £5. Fluor and felspar quiet. Fullers' earth quiet; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet without change in prices. Tungsten metal at 2s. 6d per lb. Tungsten alloy 2s. per lb. Chrome ore is in demand, and prices are stronger. Antimony ore £8 to £10 for fair quality; Antimony metal, £31 to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17. to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine) 18s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel: 20 %, £4. 12s. 6d. Silicon spiegel: 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen: Finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica: £50.

## MISCELLANEOUS CHEMICAL MARKET.

THERE is a very fair amount of business passing in many directions, and prices generally are steady. Nitrate of soda for spot delivery is still very firm, but quotations "to arrive" are lower. Coal-tar distillers are still busy, and most

products are selling well. Solvent naphtha may be considered a shade easier. Liquid and crystal carbolic acids are maintaining prices. Metals all round are lower, but there is no change perceptible in prices of their chemical products. The lower quotation of copper is no doubt temporary. Sulphate of copper is comparatively scarce, and prices range from £22 to £23 per ton.

Lead acetates are firm. Nitrate of lead is in good demand, and makers are well sold. Tin crystals can be bought at slightly lower prices. Zinc salts are firm, and there is a tendency towards advance in the price of chloride. Brown acetate of lime is perhaps a shade weaker, but there is no pressure of stocks, and prices are fairly well maintained, £9. 17s. 6d. to £10. Grey acetate of lime is unchanged. Acetic acid still sells at low prices. Soda ash and caustic soda without change. Potash, carbonate and caustic, are in fair request.

## THE SULPHATE OF AMMONIA MARKET.

THERE is not so much doing in sulphate as there was at this time last week, and several parcels have during the last few days been offered at £13, without finding buyers. To-day's prices at Hull may be said to be £12. 17s. 6d. to £12. 18s. 9d., but it is thought that the price will soon come round again to £13.

The rumour which we have heard several times repeated that a clique is at work to establish a "corner" for the Spring delivery appears to be well founded, so that makers should be on their guard. Leith market is not now so firm; but still the values at that port are abnormal so far as Hull and London prices are concerned.

## THE TAR PRODUCTS MARKET.

THE benzol market is now in a very critical position; it has not felt yet the effect of any excessive production from the carbonising works, but may do so in the course of a month. A new feature to-day is the quantity offering to the consumers by independent sellers. For the past few weeks there has been nothing offering, so that the quantity some makers are now desirous to let loose seems to indicate that a buyer of considerable importance has now ceased to take in. What effect this will have on the market we cannot foresee at present, but the situation is critical. All other tar products are in good demand and prices firm, with the single instance of pitch, which is still a drug.

# New Companies.

AUTOMATIC PUMP COMPANY LIMITED.—Capital, £10,000 in £1 shares.

LOWESTOFT AND EAST COAST ICE MANUFACTURING COMPANY LIMITED. Capital, £12,000 in £1 shares

LUCIGEN LIGHT COMPANY LIMITED.—Capital, £250,000 in £5 shares.

SHIPPEY BROS. LIMITED (Electricians).—Capital, £30,000 in £5 shares.

TYMAWR BRICK AND TILE COMPANY LIMITED.—Capital, £20,000 in £20 shares.

WEST MOODIE'S GOLD AND EXPLORATION COMPANY LIMITED.—Capital, £100,000 in £1 shares.

BOORD AND SON (distillers).—Capital, £600,000 in £100 shares.

BRAIN'S PATENT TANNING COMPANY (The Continuity System) LIMITED. Capital, 25,000 in £5 shares.

HULL BREWERY COMPANY LIMITED.—Capital, £200,000 in £10 shares.

MANNESMANN TUBE COMPANY LIMITED.—Capital, £300,000 in £10 shares.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

ARMITAGE & Co., Pendleton and Manchester, cotton manufacturers, bleachers and dyers.

GIBBS & ATKINS, White's-row, Whitechapel, chemical manufacturers, as regards E. Gibbs.

GOODALL & Co., Newcastle-on-Tyne, oil merchants, as regards H. J. Vasey.

HENLEY & Co., Commercial-road, E., oilmen, as regards F. Sikes and S. Roberts.

JONES & ROCKE, Wrexham, fellmongers and leather manufacturers.

ROBERTS, DALE, & Co., Manchester and Warrington, chemical manufacturers, as regards T. Roberts.

ROBERTS & SONS, Pendleton, dyers and finishers.

WIGG BROTHERS, AND STEELE, copper extractors, and alkali manufacturers, as regards C. Wigg.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

BLACKMORE, W. H., Bermondsey-street, Southwark, and Endwell-road, Brockley, tanner.

DAY, JOHN, Horbury, Yorkshire, colliery proprietor.

STRAFFORD, JOSEPH, & STRAFFORD, GEORGE HENRY (trading as J. Strafford & Son), Wath-on-Dearne, Yorkshire, glass bottle manufacturers.

#### First Meetings and Examinations.

BAILEY, JOSEPH, Brentnor, Devonshire, Altarnum, Cornwall, Wearde Quarry, near Saltash, Milbay Docks, Plymouth, and Camplehay, near Tavistock, mine proprietor and manganese merchant. First meeting, Jan. 20, 18, Frankfort-street, Plymouth. Pub. exam., Jan. 27, County Court, East Stonehouse.

DAY, JOHN, Horbury, Yorkshire, colliery proprietor, Jan. 17, Official Receiver's office, Wakefield. Feb. 2, Court House, Wakefield.

MCCARTHY, THOMAS IRVEN, Manchester, agent for oil manufacturers and commercial traveller. Jan. 26, Official Receiver's offices, Manchester. Feb. 2, Court House, Manchester.

SADLER, JESSE JOHNSON, Walsden, Lancashire, valetta, ammonia, and chemical manufacturer. Jan. 20, Queen's Hotel, Todmorden. Feb. 2, Court House, Burnley.

#### Notices of Dividends.

ALBERT, EDWARD, ALBERT, EMANUEL, & HAUPTMAN, FRANCIS, trading as Hauptman, Albert, & Co., Wharf-road, Latimer-road, Notting-hill, Flood-street, Chelsea, and Edinburgh, and as J. F. Stevens, at Station-road, Willesden, glass manufacturers. First dividend of 2s., Jan. 27, 46, Hanover-street, Edinburgh.

GASCOINE, ROBERT, & MACLEAN, ALEXANDER, lately trading as Maclean, Gascoine & Co., Nottingham, late manufacturers of enamelled and coloured papers. Second and final dividend of five-sixteenths of a penny, Jan. 30, and following Mondays, Official Receiver's offices, Nottingham.

#### Application for Debtor's Discharge.

DISLEY, JAMES, Wigan, oil and grease manufacturer. Feb. 23, Wigan.

# The Patent List.

*The following List has been compiled expressly for* THE CHEMICAL TRADE JOURNAL *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Antiseptic Inhaler.** R. Whitaker. 236. Jan. 6.
**Purification of Gums.** W. H. Stead. 245. Jan. 6.
**High-Pressure Tap.** J. C. Sawer. 256. Jan. 6.
**Explosives for Instantaneous Photography.** W. F. Stanley. 259. Jan. 6.
**Apparatus for Drying Substances.** M. Raty and E. Lambert. 264. Jan. 6.
**Apparatus for Grinding Substances.** M. Raty and E. Lambert. 265. Jan. 6.
**Hydrocarbon Engines.** W. D. Priestman and S. Priestman. 270. Jan. 6.
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**Improved Method of Gas Lighting.** J. Enright. 282. Jan. 7.
**Dynamo Electric Machine.** T. Parker. 293. Jan. 7.
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**Chlorate of Potash.** J. R. Wylde, M. J. Hammil, and H. Auer. 305. Jan. 7.
**Rotative Fans.** S. H. Holland. 309. Jan. 7.
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**Closed Ashpits for Furnaces.** R. W. Hewett. 315. Jan. 7.
**Making Glass Bottles.** W. S. Simpson. 322. Jan. 7.
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**Supplying Lubricants Under Pressure.** T. H. Taylor. 395. Jan. 10.
**Fever Cure.**—(Complete specification.) C. L. W. Lang. 399. Jan. 10.
**Dyeing Textile Materials.**—(Complete specification.) U. Weldon. 402. Jan. 10.
**Photographic Films.** E. W. Perry. 405. Jan. 10.
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**Freezing Machines.** W. H. Tomson. 407. Jan. 10.
**Burning Lime, Cement, etc.** J. H. Darby. 417. Jan. 10.
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**Furnaces.** A. Orsel. 523. Jan. 12.
**Mercurial Air Pumps.** H. J. Doerr and T. Mace. 529. Jan. 12.
**Sewer Gas and Sewage.** J. Arnold. 530. Jan. 12.
**Gas Lighting for Railway Trains.** E. Picard. 532. Jan. 12.

# PRICES CURRENT.

[THURSDAY, Jan. 19, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 10 | 0 |
| ,, Glacial | per lb. | 0 | 0 | 6¾ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic, 85 % | per lb. | 0 | 0 | 5 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 3 | 0 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 4⅛ |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 10 | 0 |
| ,, ( ,, 150°) | ,, | 1 | 17 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 6 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 7 |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 13 | 9 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880 = 28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1½ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 15 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 18 | 9 |
| ,, ,, (grey), Hull | ,, | 12 | 17 | 6 |
| Aniline Oil | per lb. | 0 | 0 | 10 |
| Aniline Salt | ,, | 0 | 0 | 9 |
| Antimony | per ton | 39 | 0 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 15 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 11 | 3 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 3 |
| Benzol, 90 % nominal | per gallon | 0 | 3 | 9 |
| ,, 50/90 | ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2 |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 6 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 3 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 75 | 10 | 0 |
| ,, Sulphate | ,, | 23 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 72 | 10 | 0 |
| Glycerine (crude) | ,, | 33 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 16 | 0 | 0 |
| ,, Litharge Flake, ex ship | ,, | 17 | 0 | 0 |
| ,, Acetate (white) | ,, | 28 | 0 | 0 |
| ,, ,, (brown) | ,, | 21 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 0 | 0 |
| ,, Nitrate | ,, | 23 | 15 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 17 | 6 |
| ,, (grey) | ,, | 14 | 5 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 6 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 18 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % | per ton | 2 | 5 | 0 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent | ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 10½ |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 5 | 0 |
| Cotton-seed | per ton | 21 | 10 | 0 |
| Linseed | ,, | 20 | 0 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 7 |
| ,, American | ,, | 0 | 0 | 7½ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 17 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 6½ |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 3 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 10 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 0 |
| ,, Permanganate | ,, | 4 | 10 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % | per ton | 9 | 15 | 0 |
| ,, Muriate, 80 % | ,, | 8 | 5 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 8 5/16 |
| ,, Nitrate | ,, | 0 | 2 | 9 |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) | ,, | 2 | 10 | 0 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 20 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 31 | 0 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 8 | 10 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 12 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 18 | 9 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 6 | 0 | 0 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 18 | 9 |
| ,, Bicarbonate | ,, | 5 | 15 | 0 |
| ,, Hyposulphite | ,, | 5 | 15 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 9 |
| ,, Nitrite, 98% | per ton | 31 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 2 | 0 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 17 | 6 |
| ,, Sulphide | ,, | 9 | 10 | 0 |
| ,, Sulphite | ,, | 5 | 12 | 6 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 15 | 3 |
| ,, Cane | ,, | 0 | 19 | 6 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 8 |
| ,, Barium | ,, | 0 | 0 | 5½ |
| ,, Copper (pure) | ,, | 0 | 1 | 4 |
| Sulphur (Flowers) | per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 5 | 0 |
| Tallow | ,, | 25 | 10 | 0 |
| Tin (metal) | ,, | 150 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 9 |
| Zinc (Spelter) | per ton | 20 | 0 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, January 28, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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## RIVER POLLUTION AND AIR POLLUTION.

ON Wednesday last the Manchester people were treated to an exposition of the evils which arise from the pollution of air and the pollution of our streams and watercourses; but, strange to say, the general public does not seem to care a fig, outside of official circles, of what are, and what may be, the influences upon their social life of these devastators of human comfort and happiness.

The public, aye, to a man, cries out loudly against the manufacturer; but we have on many occasions endeavoured to call attention to the fact that the bulk of the air pollution in the British Isles is caused by the ordinary householder. Most of the fogs we have recently experienced have been the result of domestic coal smoke, but of course these have not been unmixed with the smoke from factories also. To those who think upon the matter it must be patent that one cannot well burn coal and produce smoke in the quantities we are now doing without its having a bad effect on the atmosphere around us. It is said we are becoming daily more civilised, and if this means that we are getting more and more oblivious to each other's welfare and comfort, then we say, Yea, verily!

In days of yore, history tells us that house smoke was allowed to find its way out of the house through the interstices of the roof; that may have been in the days of long ago, but we fail to see the situation is much improved now. The introduction of coal for use as fuel instead of wood, caused the introduction of chimneys also; and so long as we can get rid of the volatile products formed by its combustion, we seem to be very neglectful of the harm it will do to our neighbours. Look at the immense and absolute destruction of property in the immediate neighbourhood of Manchester. At one time, when Manchester was smaller than it is to-day—*i. e.*, when much less coal was burned—Higher Broughton was a fashionable suburb; but as the city increased in size, so the older residents decamped, until empty houses has become the order of the day. Why this exodus? Simply, that Higher Broughton is in the direction of the most prevalent wind, and gets all the household smoke, so that trees are being rapidly destroyed, flowers will not bloom, and desolation reigns supreme. How has all this affected the value of property? The depreciation has been immense: houses rented at £110 per annum can now be got for £60 and less, and smaller houses, letting for £70 and £80 at one time, can now be obtained for £40, while houses formerly letting for £40 can scarcely be let at all. Has all this been due to the general decline of values which has been taking place for the past ten years or more? We say most decidedly, no. If such a suburb could be made "a place of beauty and a joy for ever," we feel sure residents would be found again willing to pay the rents of former days. Can this be done? It is possible, but not probable in the immediate future, as so much depends upon the average householder and upon conflicting interests of a number of trades. So far as the beauty of the earth is considered, and the health and life of our teeming hives of population, we should benefit by a very considerable reduction in the consumption of coal. To many localities cheap fuel has been a curse instead of a blessing, killing and blighting the surrounding neighbourhood worse than a plague of locusts. Can we go to any large town without finding the suburbs in this deplorable plight? We say no: but the answer must leave the reader to infer that the question is one of degree, and the places less injured are those where coal is dear and where the householder is compelled to practise economy in the quality and quantity of fuel he burns.

Mr. Thomson's lecture in Manchester last Tuesday on "air pollution," should cause some of us to look a little deeper than we are usually wont to do, and to examine the whole subject a little more scientifically, now that science and its results are to be seen before every man's door. We have no hesitation in saying that science has now shown how we can heat our rooms and cook our food with less than one-sixth of the fuel we now so extravagantly use, which really would be restoring the atmospheric conditions of our suburbs to that state when the city was just one-sixth of its present size. What is the use of preaching economy in these days of cheapness. The only way to press a conclusion is by means of the pocket: learned in that way the experience is valuable but not without, and it is moreover readily retained.

The manufacturer, perhaps, will not agree with us that coal should be dearer than it is to-day; but chemical engineering points to the fact that an immense waste of energy is taking place, and that much more should be effected than is now being done by the expenditure of capital, instead of useless consumption of material we can never hope to replace in our day. If we can attain the same end by means of two distinct methods, it is clearly the better policy to choose the best, and the best is no doubt that one which finds work for the human machine and at the same time leaves the atmosphere unpolluted in which he has to breathe.

This is what would be brought about were the Hargreaves thermo-motor to replace the ordinary steam engine and boiler, and we now know it. Economy upon economy has been effected in the ordinary steam engine, until we have arrived at a point where we cannot push much further; the atmosphere is laden with deleterious gases which emanate from our chimney shafts, and just in the nick of time comes in the thermo-motor to show us in a very practical manner, what energy we have been losing, and how air pollution can be reduced to a very small limit indeed. No tall chimney shafts to be seen, no dust-begrimed stokers, racing about as if escaped from the nether world. Such information would lead to a supposition that a veritable Utopia was in existence.

But turning from the subject of air pollution, we notice that on the same day a number of influential gentlemen were sitting in solemn conclave to discuss the subject of river pollution, and they have our best wishes for the success of their endeavours to clean out this Augean stable. Here again, the science of chemical engineering comes into play; with improved methods of dealing with chemical products there will be less waste, and articles will not be cast away into the river as they formerly were, and to a great extent are even now; this will be a great boon, for, once settle the question of manufacturing refuse, the sewage difficulty will be contained in a nutshell.

We are pleased to see that public officers are amongst the first to endeavour to do something in this prevention of the pollution of streams, as, up to the present time, some of our largest corporations have been the biggest offenders. In fact, in Salford it is an open question whether the expenditure of vast sums on sewage works has not been in reality a waste of money, so far as the health of the community and the purity of the river is concerned, as we have ourselves noticed that on several occasions, the sewage has been run through the precipitating tanks without any treatment whatever. But it is not the sewage question which concerns us now, it has been proved both by theory and practice, that water may be evaporated very cheaply when the operation is performed in proper appliances. As much as 6olbs. of water may be evaporated for every pound of fuel burned, so that in many cases it would be nearly as cheap to use the condensed and distilled water as to purchase it. To evaporate 60 tons of water per day with the expenditure of one ton of fuel, and securing that water for use in the works in a state of almost absolute purity, for boiler purposes, for washing, scouring, etc., is no mean advantage to be considered, when the ordinary householder is asked to pay one shilling per 1,000 gallons (five tons) for all the water he uses.

But, although we have endeavoured to prove that the manufacturer is greatly to blame for the present abominable state of our northern rivers, we have no desire to unduly shield the domestic pollutor. Let us imagine what would be his condition if the various corporations, or local boards, owners of the sewers were to say to him, we will not have your drainage in here—What would he do? And now, what would the manufacturer do, were he to be prohibited from turning his effluent into the nearest stream? Both these questions have been put to us by one of our friends, and we will do our best to answer them. Domestic drainage cannot be kept out of the sewers, as these were constructed for the sole purpose of collecting the sewage to some point of efflux, but if manufacturers be allowed to turn in their manufacturing refuse the character of the sewage is so altered as to render it in many cases unfit for sewage farming and other industrial purposes. In this connection we may point to the inquiry now going on at Bradford, near Manchester. A committee has for some time been sitting over one of the sewers there, and if they unearth the fox it will surprise us very much. The amount of money which has been squandered in this country in carrying out some alderman's or councillor's pet scheme for the purification of the sewage in our various towns is amazing, and how it comes to pass that it has been allowed to go on so long surpasses our understanding; most if not all of the money (save that spent in sewage farming) which has hitherto been spent, may be considered wasted and lost, so that when money has been borrowed for such schemes extending over long periods of repayments we are leaving a very unwelcome legacy to the next generation, who will have to commence *de novo*, and thus have a nice little bill of its own to pay. Having pointed out the fact that appliances now exist which will economically deal with waste liquors, there should be no hardship to the manufacturer in obliging him to keep them from the watercourses, and also the health departments of the various corporations should be made to do their work efficiently and not be so eager to blind the public, as some of those corporations we could mention seem to be.

Salford is at the present moment posing as the champion of unpolluted watercourses, let her examine her own position thoroughly, and if she is without blemish, then let her proceed against others, who perhaps are not at the present moment in so bad a case as Salford herself.

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German Glass Syndicate.—The syndicate of united pane-glass manufacturers in the Rhineland and Westphalia are not satisfied (says *Kuhlow's Review*) with the very large protection afforded by the *ad valorem* duty of 60 to 70 per cent. which was granted in 1879, but supported by the central association of German manufacturers, have forwarded a petition to the Reichstag for an increase of the present dues from 8 and 10 marks to 10 and 14 marks per 100 kilo., that is a further 25 per cent. of the value of the glass. The idea is to entirely exclude Belgian competition from the market. The unreasonableness of the German manufacturers' petition is proved by the following figures. The present money value of the most sought for and most largely imported glass sorts amounts to about 17 francs or 13·60 marks per 100 kilo. This is exclusive of the German import dues, which equal 8 marks, or about 60 per cent. Taking the dues as they at present are, the total advantage which the German manufacturers have over their Belgian competitors may be reckoned at 71 per cent.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND CO.

EXPERT EVIDENCE.—*continued.*

MR. ALEXANDER ESILMAN, sworn. Examined by Mr. Aston:—

Mr. Aston: I mentioned before to your Lordship in connection with this witness his impediment of speech, and I will, with your Lordship's permission, ask the witness to take a pencil and paper and, where necessary, to write down his answers, if my friend does not object?

Do you remember Messrs. Spence taking out the patent dated the 11th August?—Yes, I do.

Do you remember, before the 11th August 1882, making some experiments on manganese?—I do.

Are you an experimentalist; is it your duty to make experiments in the laboratory, or what is your position?—I am analyst to Messrs. Spence.

How long have you been engaged by Messrs. Spence in that capacity?—Nearly sixteen years.

Do you remember, some time before the 11th August 1882, making experiments on manganese?—I do.

Mr. Moulton: If the witness agrees to Mr. Spence's account, I am quite satisfied that it should be taken shortly in that way.

Mr. Aston: How came you to make those experiments? Mr. Peter Spence asked me.

What did Mr. Spence tell you to do—to use what?—He told me to try the peroxide of manganese.

Did you try the peroxide of manganese?—I did—in the hydrated form—hydrated oxide.

Did you try it in any more than one hydrated form, or only one?—In two.

Give the forms in which you tried the peroxide of manganese as you have stated?—Hydrated from chloride of manganese and permanganate of potash in the first place; and secondly, Weldon mud.

Are you quite sure that you tried Weldon mud before the patent was applied for?—Yes, to the best of my belief.

Now, here is a book which you kept in your laboratory; did you keep this book for your own profit and information, or as a matter of duty to your employers?—I kept it as a matter of duty to my employers.

In the regular course of business?—Yes.

Mr. Justice Kekewich: Now, Mr. Moulton, this may require some care, and I propose to read the entry. On page 273 I find in what the witness tells me is his handwriting the following:—"In a recent number of the *Journal of the Society of Chemical Industry*, I saw a full account of processes in which it is stated that the plumbic acid should be made and used in the cold. I have tried it before (page 260), but failed to get a satisfactory result. The plumbic acid I then used had been made hot. I now made some in the cold, and tried it as before. The result was now successful. The iron was reduced to the third decimal place in the cake. By the law of analogy, I tried $Mn O_2$ in the hope of getting a similar result, and successfully. It acted in the cold, but I found it acted even better when made and used hot, which was a great advantage. My experiments up to this point had been made with one half ounce $Mn O_2$ and 4oz. cake reduced to about 50° Tw. I now tried varying quantities of $Mn O_2$ made by oxidising; $Mn Cl_2$ by $K_2 Mn O_8$, and washing, then mixing with 8oz. of 60° Tw. (cold) liquor, and keeping near 210° F. for one hour, and then filtering off and testing for iron"——

Mr. Justice Kekewich: Then he gives the results of those experiments, and I think you had better see it.

Mr. Moulton: What date is that, my Lord?

Mr. Justice Kekewich: It comes under Tuesday, the 8th August, 1882, and the" next entry is, "Thursday, the 10th August, 1882." Then he gives the results of five experiments and says: "These results show that the quantity of $Mn O_2$ required, as compared with the cake is small, and need not be required as in plumbic process. This is a great advantage. I now tried the effect of free acid. I again took 8oz. of 60° liquor, and then 87·05 grammes $Mn O_2$ kept near the boiling point for an hour." Then he gave three results, and he continues: "These show the prejudicial effects of free acid, but still prove the powerful precipitating effect of $Mn O_2$. I now tried 2lb. of 50° from the elephant"—which is, I am told, a technical name for a pan in their place there.

Mr. Aston: It is a large digestor.

Mr. Justice Kekewich: Then he continues: "Made into a 6 per cent. $Mn O_2$, and the iron in the cake made from the liquor was after treatment ·015. This is comparatively a failure. I got some of Weldon's recovered $Mn O_2$ from Widnes, and found it to contain much $Ca Cl_2$, so washed it first of all."

Mr. Aston: That would be chloride of calcium.

Mr. Justice Kekewich: "Tried some of it with the same cake liquor as used for all the other experiments, guessing the quantity of $Mn O_2$ by bulk. $Fe_2 O_3$, a mere trace. It could not be estimated, because there had been a notable quantity of manganese gone into the solution. This solution of manganese was certainly a serious objection. I observed during the contact of the cake solution with the $Mn O_2$ made a state of slight effervescence. Complete washing of the mud from $Ca Cl_2$ did not obviate this solution of manganese, nor did boiling some time with water do any good. I found, however, that when the mud was completely oxidised the disturbance disappeared. Two experiments with permanganate of potash and bleaching powder showed that the Mn O fully oxidised was only slightly attacked by the cake solution. Of course a certain quantity must dissolve in virtue of the presence of Fe O and organic matter. I boiled 2lb. of the $Mn O_2$ mud as received from Widnes with 1oz. bleaching powder, and washed thoroughly. In another vessel I put 1olb. 100° Tw. acid (6lb. O.V.), and added gradually 6lb. ground bauxite, then boiled for one and a half hours. The temperature first rose to 250° F. and gradually fell to 223° F., at which it was maintained to the close. It was found to be decidedly basic. I had a small quantity of the unwashed Weldon mud diluted down to 60° Tw., and then put to settle. The result was not satisfactory; but little $Mn O_2$ taken out. I tried boiling the mud with 1 per cent. and 2 per cent. of bleaching powder, but did not find either of those quantities to be sufficient. Two per cent. was better than one; but about 3 per cent. is necessary." Now, about the date of that we shall require to have some explanation. This book seems to have been kept upon rather an irregular principle. These are notes or statements of what he did, put down not straightforwardly as if they came in exactly their proper place. For instance, the commencement of this is "Tuesday, the 8th August, 1882;" and there is intrinsic evidence that that date is at any rate about correct, because the date before is Saturday, the 5th August on the same page. It commences on page 273, on the left-hand side of the page, being under date Tuesday, the 8th August. It is continued on page 274, and again on page 275, that is to say going from the left to the right-hand side of the page, and then to the next left; and then at the bottom of the left-hand page 275 there is a reference to page 279, which is on the left-hand side of the book. In the interval we have entries on the right-hand side of the page for the 10th August, the 11th August, and the 12th August; and then on page 280, the next side—after the conclusion—is the 15th August.

Do you know when those entries were made; were they all made at the same time—all that I have read—made at the same time?—Not all in one day.

Can you tell us at all when you began. Did you begin on the 8th?—On the 8th.

Do you know when you went on?—On to the 10th.

Do you know whether they were all made before the application for the patent?—They were made before the 10th.

You say that all up to the bottom of page 275, where there is a reference to page 279, was made before the 10th?—Yes, my Lord.

Mr. Aston: Would it be convenient, my Lord, to make a mark there to what extent it goes, so that I may look at it.

Mr. Justice Kekewich: I have got it on the notes, and I would rather not make a mark on the book. What is continued on page 279 he says was made afterwards—not long afterwards; how long he cannot tell us. That seems to me quite consistent with the other entries in the book.

Mr. Moulton: Frankly, my Lord, it seems to me natural that he would wish to keep one investigation together, though it would extend over several days. It is quite natural that he would do so.

Mr. Aston: Will your Lordship tell me whether the reference to Weldon mud to which your Lordship referred was before page 279?

Mr. Justice Kekewich: Yes, he says, "I got some of Weldon's recovered $Mn O_2$ from Widnes." That is about the middle of page 275.

Mr. Aston: Then that would come in the interval between the 8th and the 10th,

Mr. Justice Kekewich: On the 8th or 9th. He says, "I think it was made before the 10th." It is immaterial which day.

Mr. Aston: Will your Lordship allow me to put upon it this general question.

Having looked at these notes made at the time, Mr. Esilman, are you able to state with confidence that you did try Weldon mud for the purpose of removing iron from the sulphate of alumina solutions before the date of the patent? Oh, yes.

And did you try it before the date of the patent in its completely oxidised form?—Yes.

Are you able to fix about what date that was; on the 8th or 9th, or either of them?—No, I cannot tell.

But was it one of those dates?—It was before the 10th.

Mr. Aston: Mr. Esilman, you have made experiments with peroxide of manganese in both the hydrated and the anhydrous condition, have you not?—I have.

Have you a record of those experiments in writing which you can present to my Lord?—Yes.

Is that paper in your handwriting?—Yes.

Mr. Justice Kekewich: Is this a record of experiments made by you?—Yes.

When; do you know when?—They were made some months ago.

In this year?—Yes.

Mr. Aston: Would your Lordship let me look at it and see?

Mr. Justice Kekewich: Yes. This will be marked "A E 2."

Mr. Moulton: My Lord, in order to shorten this matter, I feel quite clear that if Mr. Esilman would write an explanation of these experiments, I should very likely not cross-examine him at all about it from the look of the document. If he would write an explanation which might be incorporated with the shorthand notes of the various columns on that paper; your Lordship understands what I mean. If put in a tabulated form it will require a little careful writing, no doubt; but I think it will be better to get out the information I want in that way rather than by questions.

Mr. Justice Kekewich: You would not object to somebody writing it for him. A gentleman may be a very skilled analyst or experimentalist, but might not be able to draw up in a form which you or I should follow the expression in words of what he means.

Mr. Moulton: Oh certainly, my Lord, I will treat it quite fairly. It is only to expedite matters.

Mr. Aston: I was going to ask what the bases are that are put there generally. What he means by bases.

Mr. Justice Kekewich: Mr. Aston, subject to anything you may say, it seems a very fair thing for Mr. Esilmann, with the assistance of Mr. Chadwyck Healey, as I would suggest, or your client, to write this out in the form as if swearing to it in an affidavit.

Mr. Aston: Could the solicitor do it, Mr. Robinson Walker?

Mr. Justice Kekewich: Oh, yes, he may do so.

Mr. Aston: And he will show how he made the Weldon mud anhydrous.

Mr. Moulton: My Lord, there will have to be cross-examination when it is written out, and I should suggest that my cross-examination might be postponed.

Mr. Justice Kekewich: Yes, you can recall him. Is there any more you have to ask him, Mr. Aston?

Mr. Aston: No, my Lord, subject to your Lordship giving me leave when I see the whole paper written out, or I will put the questions through your Lordship, if necessary—if I think them desirable.

Mr. Justice Kekewich: Yes, anything more which appears on this paper which you think it necessary to answer. We will give you an opportunity of looking at that. The witness may now sit down, and he shall have an opportunity of taking time to prepare the paper. Is your client there, Mr. Aston?

Mr. Aston: Yes, my Lord.

Mr. Justice Kekewich: Then what I want him to do is to take Mr. Esilman out of the Court and to incorporate with that tabular statement a statement in words as if he was drawing an affidavit stating that in the first column he has set out so and so, and in the second so and so, going through them at some length.

Mr. Aston: I have it here, my Lord, done in an extended form, as my instructions.

Mr. Justice Kekewich: With Mr. Esilmann's entire concurrence?

Mr. Aston: I think so, my Lord.

Mr. Justice Kekewich: Have you done that, have you made any statement?—Yes, I think so, my Lord.

Mr. Aston: I do not know they tally, my Lord.

Mr. Justice Kekewich (examining the paper): This will not do, this is a proof, and nothing more. I do not want to know what it is suggested that you should ask Mr. Esilman, I want his statement on that particular document without any exercise of counsel's discretion as to his mode of expression, and the real facts. Any reasonable time can be given him to-day.

Mr. Aston: Oh, yes, my Lord. Then I will only ask one other question.

Was the Weldon mud which you got from Widnes that Weldon mud which is the subject of this delivery note which I will hand to you?—I think it is likely to be, but I could not swear to it. It was not my function to get it.

Mr. Aston: What is the date of that, my Lord?

Mr. Justice Kekewich: The 10th of August.

Mr. Aston: Just look at the statement in your book, "I got the Weldon mud from Widnes?"—I believe it would be the same.

That was delivered on the 10th?—I think so, but I am not sure.

Mr. Justice Kekewich: Did you have any other Weldon mud about that time, either before or after?—I do not remember, but I think not.

Mr. Aston: Would your Lordship allow me to see the delivery note again?

Mr. Justice Kekewich: You shall in a moment, Mr. Aston. Will you ask Mr. Spence whether there was any book in 1882 kept at their works recording the receipt of parcels?

Mr. F. M. Spence: Not of small parcels (samples), my Lord.

Mr. Justice Kekewich: Then if anything turns upon this we must ascertain from the London and North-Western Railway Company.

Mr. Aston: If your Lordship pleases.

Mr. Justice Kekewich: We shall probably trace it there.

Mr. Aston: Where is it dated from?

Mr. Justice Kekewich: St. Helens Foundry, Lancashire, 10th August.

Mr. Aston: Will you ask, my Lord, if that is at Widnes?

Mr. Justice Kekewich: Is that at Widnes?—I do not know that there is a St. Helen's Foundry at Widnes.

You are sure you got the Weldon mud from Widnes. It is stated so there—in the book—what made you write that? I was told by one of the clerks in the office of the firm that the Weldon mud which was supplied to me came from Widnes. I cannot remember which of the clerks told me.

Mr. Aston: Is that all you know?

Mr. Justice Kekewich: I asked him why, in that book, he wrote: "I got Weldon mud from Widnes," and he answered, "I was told so." I asked him to explain who told him, and he wrote that down which I have read.

Mr. Aston: I do not know whether your Lordship thinks I might ask on that whether he had ever seen that delivery note.

Mr. Justice Kekewich: Have you ever seen that delivery note before it was produced in Court?—No, my Lord. I have never seen it before now.

Mr. Justice Kekewich: The cross-examination, Mr. Moulton, I think, should now be deferred. That will have the double advantage of probably eventually saving time and trouble, and also enabling you to see that book. (*To the Witness*): You must be prepared to come here again, if necessary, and to make that statement as required. The object is to save trouble. Give us a full explanation, and simply an explanation of what there is on that paper—as much as ever you like of explanation of that, but do not go into anything else at all.

Copy of Exhibit.—A. E. 2.

6 per cent. $Mn O_2$ to 100 parts cake.

| Parts in Million. | With bases extracted by— | $Fe_2 O_3$ Removed. | | Cake made per cent. |
|---|---|---|---|---|
| 9½ | $H_2 S O_4$ ... ... ... ... ... ... | 90·32 | ... | ·00095 |
| 19 | | 98·65 | ... | ·0019 |
| 5 | Bases extracted by H. N. $O_3$ ... | 99·64 | ... | ·0005 |
| 4·8 | Bases extracted by H Cl cold ... | 99·66 | ... | ·00048 |
| 48 | Bases extracted and $Mn O_2$ made anhydrous... ... ... ... ... | 96·60 | ... | ·0048 |
| 33 | Weldon mud (anhydrous) ... ... | 97·66 | ... | ·0033 |
| 1,020 | Finely ground ore ... ... ... ... | 27·66 | ... | ·102 |
| 1,000 | Finely ground ore (purified) ... | 29·13 | ... | ·100 |
| 132 | Tennant's recovered manganese ... | 90·63 | ... | ·0132 |

In each experiment the proportion of peroxide of manganese to dry alum cake was 6 to 100.

FIRST EXPERIMENT.—I used fully oxidised Weldon mud, and extracted 99·32 of the iron.

SECOND EXPERIMENT.—Fully oxidised Weldon mud from which the lime had been extracted by sulphuric acid. Iron extracted, 98·65.

THIRD EXPERIMENT.—Fully oxidised Weldon mud from which the lime had been extracted by nitric acid. Iron extracted, 99·64.

FOURTH EXPERIMENT.—Fully oxidised Weldon mud from which the lime had been extracted by hydrochloric acid. Iron extracted, 99·66.

FIFTH EXPERIMENT.—Fully oxidised Weldon mud from which the lime had been extracted by nitric acid, and the remaining hydrated peroxide dried and heated to 500° F. Iron extracted, 96·6.

SIXTH EXPERIMENT.—Weldon mud fully oxidised, and heated to 550° F. Iron extracted, 97·66.

SEVENTH EXPERIMENT.—Finely ground ore. Iron extracted, 27·66.

EIGHTH EXPERIMENT.—Finely ground ore purified from iron. Iron extracted, 29·13.

NINTH EXPERIMENT.—Tennant's recovered peroxide. Iron extracted, 90·63.

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Mr. JOHN GLOVER, sworn. Examined by Mr. Aston:—

Mr. Glover, you have had forty years' experience in connection with chemical manufacture?—I have.

And you are the inventor of the well-known Glover tower, which is very largely used?—Yes.

Have you read and made yourself acquainted with the specification of Messrs. Spence?—Yes.

Now, in your opinion could a person reading Spence's specification ascertain from it in what form to use peroxide of manganese?—Yes.

In what form do you say that a person would be led to use peroxide of manganese, following Spence's direction?—Taking Spence's specification as a manufacturer, if I was proceeding to put it into practice and to make sulphate of alumina, I should, of course, begin first upon the article that lay readiest to my hand, and that, of course, would be the natural peroxide of manganese. From that I would certainly proceed to use the other next article, which at the present date is most ready to my hand, and that would be Weldon mud. Upon the result of those experiments I would guide my future course.

Now, peroxide of manganese is spoken of on page 12, line 14, for the first time, is it not in Spence's specification?—Yes, I have got it.

And the form in which that peroxide is directed to be used is an artificial peroxide?

Mr. Moulton: I must protest. You have had a fair answer from your witness as to what it conveys to him, and I do not think you ought to suggest or ask a question in that form.

Mr. Justice Kekewich: No, I think not.

Mr. Aston: But we say peroxide of manganese, which we form artificially.

Mr. Justice Kekewich: It is a bad form of question altogether. There is no reason why you should not ask him—that is referring to any line you like—what he understands by the words there used.

Mr. Aston: Very well, my Lord.

Turn to line 17 of the specification. "Such peroxide of manganese we form artificially in a mode," and so forth. What do you understand by that?—In a mode similar to the production of Weldon mud—that is, as Weldon mud is produced from solutions of manganese.

Now, supposing that you as an experimental manufacturer tried the peroxide of manganese to which you referred first, what should you do?—I would judge from the effect produced.

But how would you try it?—I would try it by putting the manganese into the finest possible state of division, and mixing that with the sulphate of alumina solution containing the salt of iron that I wished to remove.

Why should you put it in a fine state of division?—From the well-known fact that in chemical reactions the finer the state of division the more active the reaction.

Was that well-known in 1882?—Of course it was, and for years before.

Then content yourself by saying yes?—Yes.

Now, how would you get your peroxide into a fine state of division?—The finest state of division possible with material of that kind is to levigate it in water.

What do you mean by levigating it in water?—If I was trying an experiment in the laboratory, what I would do to begin with would be to levigate it in a mortar, possibly an agate mortar, and with water floating off the lighter portion which was suspended in that water.

Then that is thoroughly pounding in the mortar?—Thoroughly levigating with water in the mortar.

Mr. Justice Kekewich: Is the method of pulverising, or whatever the word is, important. You are going now into the different ways which different people may think best for obtaining a fine division.

Mr. Aston: Well now, assuming that the problem is to produce peroxide of manganese from a lower oxide—say the protoxide, for instance. Was it well known that you could do that in 1882?—Well known to manufacturers in the form of Weldon mud.

Supposing you were told to produce peroxide of manganese from the higher oxides—such as manganic acid or permanganic acid, or their salts—would people have known in 1882 how to do it?—To produce peroxide of manganese from manganic acid, or its salts, do you say?

Would it have been known in 1882 that you could do it, and would the mode of doing it have been known?—In 1882 it was well known that you could get peroxide of manganese from manganic or permanganic acid.

CROSS-EXAMINED BY MR. MOULTON.

Do you say it was well known that you could get peroxide from manganic acid?—From manganic acid. By the addition of another acid you can liberate it from its base, and so get peroxide of manganese from such liberation.

Just listen to me, Mr. Glover. I am not talking about the salts of manganic acid, but I am talking about manganic acid itself.—Manganic acid itself has not been isolated. I believe it has been separated from its base, and in that form it would certainly be useful and would be very active as an oxidising agent in the process of oxidation, taking permanganic acid from the process of such oxidation, and peroxide of manganese would be thrown down.

Quite so, but I am talking—and just confine your attention for one moment to my question—I am talking, not about the salts of manganic acid, but of manganic acid itself. It was not known in 1882 how to make manganic acid, was it?—I think it was. I think manganic acid was known. Manganic acid as a manganate was known in 1882.

I am not talking about its salts, manganates; I am talking about the acid itself. It was not known in 1882 as a separate substance?—I am not aware that it is known yet as a separate substance.

Then you could not have got the peroxide from manganic acid as you had not got the manganic acid itself?—We could get it in the decomposition of the manganate.

I am not talking about the manganate, Mr. Glover. You have stated that if you were making experiments you would use the substance directed in a fine state of division. Now, is there anything in that specification to tell you that a fine state of division is necessary for the peroxide of manganese? There is not anything in specific terms to show that you have to finely divide it, but it is a well-known fact in chemistry that you must finely divide it.

Now, Mr. Glover, do you mean to say that you could not have used anything in chemistry to put into a solution without finely dividing it?—If I want to get a reaction from that substance I must finely divide it.

You get it in a powder?—In a powder?

Do you mean to say that black oxide of manganese is not in a powder?—We begin from the natural oxide of manganese, and you must reduce that to a powder if you want to get it in a state in which it will react in this connection.

But it is sold generally in a powder, is it not?—No; the peroxide of manganese is found generally in masses.

But it is crushed up into a powder?—When you pound it of course it is reduced to a powder.

You mean that you ought to pulverise it before putting it in a solution—that you must reduce it to a powder?—Yes.

Just like the state in which you use it when you want to make oxygen with it?—Yes.

Mr. Justice Kekewich: Have we made the most of manganic acid yet? Every witness who has been asked about it has stated the same thing without the slightest variation, yet on you go asking questions about manganic acid.

Mr. Moulton: I should not have asked it only I thought I had proved my position in regard to it.

Mr. Aston: If I could have asked this gentleman, "Do you agree with the evidence of those who have preceded you?" I would have done so; only for physical reasons (this witness was deaf)—I could not.

Mr. Moulton: I will not ask anything further. I think I have sufficiently got my point.

Mr. Aston: That will be for my Lord. I have heard you say so several times.

Mr. Moulton: I have got sufficient to satisfy my mind, if not yours.

Mr. Justice Kekewich: I do not wish to hear anything more about the nonexistence of manganic acid. If any witness tells me it does exist, that is another thing.

Mr. Aston: My case is that it does not exist in a separate form. That is my case, my Lord.

Mr. Justice Kekewich: Now, if we can get rid of this question about the threats first—I do not say I shall get rid of it myself; that will occupy us to the adjournment, and we can dispose of that, Mr. Moulton, before you open your case; but, as that point has been put forward to some extent by yourself, it seems to me capable of being tried independently from the rest of the case, and I think you had better exhaust what you have to say, and call what evidence you propose to call on that question before you go on to the rest of the case. I think you had better do so. Please understand that I will express my views on it in due course by and by. Though the shorthand writer has stated by a slip of the pen that it was a preliminary objection I do not so regard it. I do not wish it to be understood that I wish to be severe on the shorthand writer, for I wonder that the notes are so well done as they are.

Mr. Aston: Especially in a chemical case, my Lord.

Mr. Justice Kekewich: Are you going to call evidence on this, Mr. Moulton?

Mr. Moulton: I propose to call Mr. Harrison and Mr. Rayner.

Mr. Justice Kekewich: Then let us get rid of this.

Mr. Moulton: Very well, I will adopt your Lordship's suggestion.

*(To be continued.)*

## VOLAPÜK.

THE Balloon Society of Great Britain at their last weekly meeting at St. James's Hall discussed the subject of "Volapük." The chair was occupied by Mr. Samuel K. Bowes. The lecture was given by Mr. K. Dornbusch (a member of the Volapük Academy).

The ingenious author of the Volapük system is a Catholic priest (at present non-officiating) named J. M. Schleyer, in the town of Constance. This gentleman is a great linguist; he is reputed to know fifty languages, and is very musical. For twenty years he has devoted his energies to the production of his universal language, which he first gave to the world seven years ago. Briefly explained, the system is as follows:—

He takes 20,000 roots of words from different existing languages (one third of the total being English roots) and gives each root a distinctive meaning. The roots form the Volapük vocabulary. These nouns are masculine or feminine according to sex, non-sexual things being reckoned masculine.

To the root a different vowel is added to represent different cases, an "s" being added to make the plural; thus, fat = father; falta = of a father; fats = fathers; fatas = of fathers. An adjective is invariably formed by adding the suffix "ik" to the noun; thus, nat = nature; natik = natural. The personal pronouns are added to the verb to form the different persons; thus, löf = to love; ob = I; ol = thou; therefore, löf ob = I love; lof ol = thou lovest. The whole language is thus built up. That it will ever supersede ordinary languages seems in the highest degree improbable; indeed, Mr. Dornbusch very forcibly disclaimed any such intention, merely suggesting that it might in the future become the language of commerce in the same way as chemical symbols and musical notes are current throughout all civilised countries.

The foregoing we extract from our contemporary *Invention*; the following is what the *Newcastle Daily Chronicle* has to say upon the subject:—

As reported from Paris, the meeting held by the propagators of "Volapük" has been full of promise for the universal language. From the Caucasus to the Salt Lake City the new world-speech is making headway. It has its grammars and dictionaries for many peoples, and thirteen newspapers. It has a regulating Academy at Munich, and there is to be a Congress of Volapükists in 1889. Notwithstanding, Volapük will pass away like leaves in autumn, because languages are not made, but grow. This new world-speech must perish, because nobody speaks it now or is expected to speak it in future. It is designed as a written medium for the purposes of science, commerce, and diplomacy, but it is not intended to have a literature. So that it is doomed to perish—to be still-born, in fact.

There is nothing new, as has been repeatedly explained, in this Volapük or universal language—nothing new in the notion, however much in the method. From remote times there have been dreamers dreaming a like thing—dreaming of undoing the confusion wrought at Babel. The great Leibnitz thought of it, and so did our countrymen, Beck and Wilkins, and the Scotchman, Dalgarno. Though there was nothing but failure for the attempt of the latter to give the world a universal language, yet it was not fruitless. For Dalgarno's attempt resulted in that inestimable blessing, the deaf-and-dumb alphabet. Then there was the eccentric chief of the Cromarty Urquharts, who tried to raise the North in favour of the King and against the Parliament, who was taken prisoner at the battle of Worcester, who wrote a book proving that the Urquharts can trace their descent, name by name, up to Adam and Eve, and who died of joy on hearing, when a refugee, that Charles II. was restored. Among the works which Sir Thomas Urquhart left behind him is "Logopandecteision," which is another word for Volapük.

There is already a world-speech, if the Volapükists had only the sense to lay hold on it for their purpose, and whether or no they have the sense to do so. It is our own English language, which is the native and dominant tongue of nations occupying more than ten million square miles of the earth's surface, which, in addition, is every day gaining ground among the 260 million people of India, which is the language of the international commerce in China and Japan, which is spoken in all the maritime ports, which is the language of the high seas, which is the language most easily learned, which has a literature second to none, which has more one-syllabled words than any other tongue, and which is the language of more than one half of the world's newspaper press. English has only two rivals in the way of a world-speech. They are Russian and Spanish.

## HOMŒOPATHIC MEDICINES.

DR. DUPRÉ sends the following letter to *The Times*:—

Sir,—to argue with a believer in homœopathy about homœopathy is as profitless an undertaking as to argue with table turners, spiritualists, and earth flatteners, and I am not inclined to essay the task. I should, however, like to ask Dr. Millican the following question:—Why was it found necessary to bring the attar of roses all the way from Constantinople? If Dr. Millican had merely asked a friend to spill a drop of the attar at Constantinople, this would, on homœopathic principles, have been more than sufficient to scent his house here in London for years after.

The main object of this letter, however, is to give some facts regarding homœopathic pilules which may show the sensible portion of the public on which side unbounded credulity is to be found.

In 1873 I examined, for my friend the late Dr. Anstie, a number of homœopathic pilules, obtained from houses well known in London and Liverpool. The results were published by Dr. Anstie in the *Practitioner*, vol. x., page 254, and vol. xi., page 55. Those specially interested will find in the latter volume the names of the houses from which the pilules were purchased. The dilutions chosen were what are known as the first and second, these being the only dilutions which are at all within the range of chemical analysis.

The following, shortly stated, are the results of the analyses:—

Sulphate of copper pilules, second dil.—First sample—No copper could be detected in 100 pilules. Second sample—No copper could be detected in 200 pilules. If in the second case as little as 1-2,000,000th of a grain of sulphate of copper per pilule had been present it would have been detected.

Corrosive sublimate pilules, second dil.—Two samples.—It was just possible to detect mercury when 200 pilules were

taken for analysis. Less than 1-400,000th part of a grain of corrosives sublimate per pilule was present.

Nux vomica pilules, second dil.—No strychnine could be detected, even when 300 pilules were taken.

Belladonna pilules, second dil.—No atropine could be detected in 300 pilules. If as little as 1-2,000,000th of a grain per pilule of either strychnine or atropine had been present it would have been detected.

Aconitum napellus pilules, first dil.—First sample—No aconite could be detected in 100 pilules. Second sample—No aconite could be detected in 100 pilules. If as little as 1-800,000th part of a grain of aconite per pilule had been present it would have been detected.

Belladonna pilules, first dil.—First sample—No atropine could be detected in 100 pilules by chemical means. Second sample—No atropine could be detected in 100 pilules by chemical means. If as little as 1-600,000th part of a grain of atropine per pilule had been present it would have been detected.

The above facts were published in the *Practitioner* in the year and volumes before mentioned, and, as far as I am aware, they were never called in question.

It will be seen that the only instance in which I could at all detect the presence of the active ingredient was that of the corrosive sublimate pilules. In all the other cases I failed to detect the active ingredient professedly present, and, although I do not wish to affirm that these ingredients were entirely absent, I have given the quantities more of which they cannot have contained, and they are infinitesimal doses. Yet, according to homœopathic notions, even these quantities are exceedingly large. These pilules represent the weakest kinds used—*i.e.* those containing the *maximum* amount of drug. To render them really powerful they would have to be diluted many millions of times.

It is but fair to state that the method adopted in the manufacture of at least several varieties of the pilules satisfactorily explains some of the statements made in "R.B.C.'s" letters, which seemed to throw doubt on the honesty of the dispensers of these pilules.

The pilules are, in the first place, made from pure milk sugar, and are then individually moistened with the desired amount of a tincture containing 1-100th, 1-10,000th, etc., of a grain of a so-called mother tincture of the drug required.

I leave the public to draw their own conclusions, and remain,—Yours, etc., A. DUPRÉ.

## INSECTICIDES.

THE Bureau of Entomology, Department of Agriculture, Washington, sends out the following for use as insecticides on or about plants, etc.:—

**London Purple.**—To 20lb. flour from one-quarter to one-half pound is added and well mixed. This is applied with a sifter or blower. With 40 gallons of water one-quarter to one-half pound is mixed for spraying.

**Paris Green.**—With 20lb. of flour from three-quarters to one pound is mixed and applied by sifting or by a blower. The same amount of the insecticide to 40 gallons of water is used as a spray.

**Bisulphide of Carbon.**—For use in the ground a quantity is poured or injected among the roots that are being infected. Against insects damaging stored grain of museum material, a small quantity is used in an air-tight vessel.

**Carbolic Acid.**—A solution of one part in 100 of water is used against parasites, and domestic animals and their barns and sheds; also on surface of plants and among the roots in the ground.

**Hellebore.**—The powder is sifted on alone or mixed one part to twenty of flour. With one gallon of water one-quarter pound is mixed for spraying.

**Kerosene-Milk Emulsion.**—To one part milk add two parts kerosene, and churn by force-pump or other agitator. The butter-like emulsion is diluted *ad libitum* with water. An easier method is to simply mix one part kerosene with eight parts milk.

**Soap Emulsion.**—In one gallon hot water one-half pound whale-oil soap is dissolved. This, instead of milk, is mixed with an emulsion with kerosene in the same manner and proportion as above.

**Pyrethrum.**—(Persian insect powder).—Is blown or sifted dry; also applied in water, one gallon to a tablespoonful of the powder, well stirred and then sprayed.

**Tobacco Decoction.**—This is made as strong as possible as a wash or spray, to kill insect pests on animals and plants. —*Southern Planter.*

## A MODEL FACTORY.

THE United States Consul at Mannheim, in a recent report describes the glass works at Waldhof, which were established by a French Company in 1853 in consequence of the large import duties levied on plate glass imported from France into the Grand Duchy of Baden. It has grown to an establishment of large proportions, manufacturing and shipping every year to all parts of the world over 100,000 square mètres of mirror glass. The day's work is from six to six, with 1½ hours for meals, and the wages vary from 2s. 5d. to nearly 5s. a day; 340 dwellings lodge the 1,800 inhabitants of the village, and they are so well appointed and so arranged that each family has its apartments entirely separate from every other family. The dwellings are for the most part very simple, yet very convenient and comfortable. A piece of —a flower and vegetable garden—is attached to each dwelling, also a stable in which a cow or a couple of goats may be kept. The houses are kept in repair free of charge, and are rent free. Grocery and provision stores have been established by the company where all necessaries can be purchased at cost price: the goods sold are of the best, the principal *employés* purchasing at the same place as the poorest workman. If there is a balance of profit at the end of a month, prices are reduced until it is worked off. Schools are provided to which the children must go until they are fifteen, libraries have been established, and a hospital attended by sisters of charity supported by the company exists in the village. The "colony," which was originally French, is daily becoming day by day more and more German. The old people still speak French, all seem happy and contented, and no one ever thinks of emigrating. It is not unusual to find three generations, grandfather, father, and son, working side by side.

## LECTURES ON WROUGHT-IRON.

THE first of a course of six popular lectures on wrought-iron was delivered last week, in the chemical lecture theatre of the Mason College, by Mr. Thomas Turner. In a brief review of the history of the subject, the lecturer said that in all the earlier and primitive methods of iron manufacture the metal produced was wrought-iron, which in these cases was extracted by very simple processes, directly from the ore. There is evidence that such methods were early practised by the Egyptians, Assyrians, Chinese, Greeks, and Romans; and that during the Roman occupation of this country large quantities of iron were so produced in England. These direct but crude methods continued to be employed by the Saxons and early English, though the amount of iron so produced was comparatively small. It was not until early in the sixteenth century that the properties of cast-iron were known, and it was probably produced accidentally in the first place, by the adoption of somewhat larger furnaces than those previously used. When the properties of cast-iron became known, the small hearth, known as the finery, was soon employed for the preparation of wrought-iron from cast-iron. In this way the present "indirect" method of production originated, and, though it has since been considerably altered, the indirect method is still found to be the most economical and generally convenient process. The direct process now survives only among semi-savage races, or in districts where fuel is cheap, and carriage on imported materials practically prohibitory. It is on account of these reasons that the direct method is largely conducted in outlying districts in America, where in improved furnaces called "bloomeries" wrought-iron is still produced from the ore in a single operation. For upwards of a century after the death of Queen Elizabeth, the iron trade of this country languished for lack of fuel and other causes. But with the successful application of pit coal and the introduction of the steam-engine a decided revival took place, though probably the most important advance dates from the introduction of the puddling process in 1784, by Cort. This rapidly replaced the old fineries, except for very special purposes, and for nearly a century reigned supreme, with scarcely a single rival, as the cheapest and most convenient method of purifying crude pig-iron. Nor was it until Sir H. Bessemer first showed the commercial success of his wonderful invention that the decline in the

wrought-iron trade began. Bessemer aimed at producing a material which would for many purposes replace wrought-iron or steel, and all the world knows how this has been accomplished. During the first few years of the competition between steel and wrought-iron, the latter did not suffer, except, of course, relatively; but in recent years the case has been very different, and the importance of the change to this district is shown in the following figures, taken from Government returns:—In 1886 there were in the United Kingdom 227 wrought-iron works, with 3,378 puddling furnaces, and 666 rolling mills. Of these, the district of North and South Staffordshire and Worcestershire included 106 works, 1,651 puddling furnaces, and 221 rolling mills. In 1886, the production of puddled bar in the United Kingdom was estimated at 1,616,701 tons, of which this district, including Shropshire, produced 671,546 tons. Thus in 1886 nearly one-half of the ironworks, one-half of the puddling furnaces, one-third of the rolling mills, and over one-third of the production of the United Kingdom was connected with the district immediately surrounding Birmingham. But as compared with 1885, these figures show a decrease for the United Kingdom of 11 works, 498 furnaces, and 135 rolling mills. This decrease becomes all the more serious when taken in connection with the increased production of all varieties of steel which come into competition with wrought-iron.—This is illustrated by the following figures:—

| | 1884. TONS. | 1885. TONS. | 1886. TONS. |
|---|---|---|---|
| Bessemer steel ... | 1,299,676 ... | 1,304,127 ... | 1,570,620 |
| Siemens steel ..... | 475,250 ... | 613,200 ... | 694,150 |
| Basic steel ..... | 179,000 ... | 145,707 ... | 277,258 |

From which it will be seen that the production of each variety of steel has increased during the period that the production of wrought-iron has so seriously diminished. Again, when it is remembered that steel is manufactured chiefly in South Wales, the North of England, and in Scotland, while wrought-iron is manufactured chiefly in this district, the serious character of so adverse a change is more clearly evident. Nor has the matter improved during the time that has elapsed since the Government records were issued, for since then, several of our oldest and largest firms have been brought very prominently before the public on account of their commercial difficulties. There is little doubt that this gradual replacement of wrought-iron by steel will proceed further; but, on the other hand, it is also certain that for a variety of purposes wrought-iron will still be preferred. The last official records still show that more wrought-iron is produced than Bessemer steel, which is its most formidable rival; and though this state of things cannot be expected to continue, and may even have been reversed by this time, still it shows that there is yet a considerable vitality in the puddling process. It is only by combining the sound business principles of the past with the best scientific knowledge of the present, that an industry now so seriously threatened can survive and prosper. The chemical knowledge which from the first has been employed by the steel-makers should also be enlisted in the service of the older industry; and when rightly employed, very great benefit may be anticipated from the knowledge of the composition of the iron and other materials employed. Mr. Turner then entered into details with regard to the chief ores employed in the production of wrought-iron, and described several of the earlier methods of direct production.—The lecture was well attended, a number of gentlemen connected with the local iron trade being present.

## HIGHLAND AGRICULTURAL ASSOCIATION.

CHEMIST'S REPORT.

At the last anniversary meeting of this society held in Edinburgh, Dr. Aitken, chemist to the society, submitted reports on the experimental stations and the grants for analysis. The experiments at Harelaw had now, he said, come to a close. The crop last season was barley, and the object in view was to estimate the amount of unexhausted fertility remaining in the land, and derived from the annual supplies of manure that had been given in former years. At Pumpherston the crop was barley, sewn out with seeds for permanent grass, and no manures were applied. The grass mixture consisted of a fair proportion of the different grasses, clover, etc,, suitable for pasture; and if they might judge from the appearances presented by the various plots during the autumn, the grass experiments promised to be very interesting. There was no crop which required more attention paid to it than grass in these times, and the plots at Pumpherston presented facilities for studying the manurial treatment of grass which were quite unique. The chemical committee had had under consideration a scheme for bringing the chemical department of the society into more intimate relation with the local wants of agriculture. Owing to the very diverse conditions under which agriculture was pursued in this country, different districts differed widely in their practice and aims, and it was the desire of the chemical department to aid, as far as possible, in improving and developing the agriculture of different districts in any way in which chemistry could be of service. The scheme is at present receiving the attention of the directors. The number of analytical associations applying for grants this year was fifteen—two less than last year. The number of analyses for which grants were given was 182, and the amount of the grants £76 10s. The number of samples deficient from their guarantees was less than usual, but there were four or five so very deficient that the details would probably be published in the next volume of the "Transactions." Out of the 182 samples there were only twelve feeding stuffs. There might have been more analysed, but only those having an analytical guarantee were eligible for the society's grant. All such guarantees as "pure," "genuine," "concentrated," and the like, were quite useless. They gave the buyer no indication of the feeding value of the stuff. If feeding operations were to be carried on with any precision, the feeder must know the composition of the food he was using. He ought to know what he wanted, and see that he got it. Sellers were frequently unable or unwilling to supply the analyses of the cakes they sold, but if farmers insisted upon it they would get them. There had been a gradual falling off in the number of analyses sent in by the associations, and the drop this year was very considerable. The numbers for the last four years had been 273, 262, 239, and 182. This might be due to hard times causing a diminution in the number of members and the number of their purchases; but whatever the causes were, the fact was that the number of analyses returned by the associations was not one-seventh of what was expected at first. It must not be inferred from this that the connection of the society with the associations had been a failure. It had been a marked success, and had done an incalculable amount of good. The quality of the work done was excellent, but the quantity was deficient. In these circumstances the directors had resolved to give to the members of the society privileges in respect to analysis in a direct manner as well as through the medium of associations.

## SULPHUROUS ACID SOLUTION FOR USE IN THE BOILING OF WOOD PULP.

Some time ago, Professor Pictet and George Louis Brélaz devised the process of digesting wood in a strong solution of sulphurous acid, in order to reduce it to pulp for paper making. The solution of sulphurous acid is first prepared by conducting the vapours issuing from sulphur or pyrites burners up an absorbing tower, down which a stream of water is made to pass. In order to bring this solution to the degree of concentration necessary for the disintegration of the wood, two boilers are employed, of which only one is heated. Both boilers are filled with the weak solution of 1°—2° Beaumé (sp. gr. 1·006—1·013), containing from 2·5 to 5 per cent. of $SO_2$. The heat acting upon the contents of the one boiler drives out the sulphurous acid gas, which is conducted by a pipe placed in the upper part of the boiler into the second or cold one. The liquid in the cold boiler absorbs the gas evolved from the first boiler, while the hot solution freed from its gas flows out at the bottom of the heated boiler. The latter is now filled up again with a weak solution, which likewise is made to give off its gas to the cold boiler, until the contents of the latter reach a concentration of about 10 per cent., which is the strength required for the disintegration of wood.

According to Storer's Dictionary of Solubilities, an aqueous solution of sulphurous acid saturated at 16° C. is of sp. gr. 1·0392; and Schiff states that a solution of 1·0410 sp. gr. contains 14 per cent. of $SO_2$, so that there is ample room for the exercise of a little chemical engineering in the preparation of the solutions of this gas.

# Correspondence.

## ANSWERS TO CORRESPONDENTS.

C. G.—No, we are not proposing to issue cases for binding. The volumes, of which we have only a few left, are now ready.

J. H.—We cannot advise you, but you may gain some information from our Market Reports.

D. E.—We gave the method by which Margarine is produced in one of our early numbers. Consult the index of Vol. I.

J. H. R.—We do not think the process will go, and certainly advise you to be careful.

C. C. J.—Your letter is libellous, and therefore we cannot insert it.

LUCIFER.—The oil should be carefully produced; we may have an article on the subject shortly.

REX.—Use chromic acid instead. It would be cheaper and better.

A. J. C.—See our article on "High Strength Caustic" in our next number.

GAS.—Yes, most decidedly. A gasworks possesses within itself the whole of the materials, without any extra purchase, for the working-up of its residuals into finished products; that is, when once started.

J. A. B. (Syracuse).—Write to the Secretary, Burlington House, Piccadilly, London, who will furnish forms of membership. The Editor is not a Fellow of the Society, having resigned about two years since.

**** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—No doubt the opinions expressed by your correspondents on this matter are in the main correct. There is no doubt a very widespread dissatisfaction with the action or inaction of the Council, but at the same time there appears to be no common ground for agreement amongst your various correspondents. Does not this point to the want of a periodical meeting of the Fellows in the various districts, so that Institute matters may be freely discussed? Would it be possible to form in various parts of the country sections of the Institute, as, for instance, has been done by the Society of Chemical Industry? In Manchester Mr. W. Thomson has endeavoured to come to the front in this way, and could he not put his shoulder to the wheel and form a Manchester Association of Fellows of the Institute of Chemistry? If this were done no doubt other sections would be quickly formed in Liverpool, Birmingham, Newcastle, Leeds, Glasgow, and other places. Such associations, even if only formed of a dozen members meeting quarterly would no doubt do a large amount of good.

I hope you will find space to print this letter, so that we may hear what other Fellows of the Institute think of it, and in concluding I may say that I for one cordially agree with your correspondent in last week's issue, that new blood is wanted, not only amongst the ordinary members of Council, but in higher places. The Institute of Chemistry should not be ruled by schoolmasters, and it is high time that "Practising Fellows" spoke this out plainly. An election is now about to take place, and country Fellows should be up and stirring.—I am, etc., A HIGHLANDER.

*To the Editor of the Chemical Trade Journal.*

Sir,—I think all your correspondents are a little too much in a hurry in expecting the Institute to move at such a rapid rate as they seem to wish. Any one with a grain of common sense should be able to see that what some of your correspondents desire can never be accomplished. It cannot, for instance, be expected that the Institute will ever be in a position to dictate to an employer what wages or salary he shall pay to his chemist. I am now alluding specially to the letter signed "Menenius;" is there a precedent for any such interference, I would like to ask him. He mentions particularly law and medicine. Now, is it not a fact that Medical Officers of Health are the servants of the Board appointing them, and that in some districts they are very badly paid? Why is it, then, that the Medical Council does not step in and say, "You must not work for so low a salary?" Simply because such a step would be opposed to public policy when the action is taken by a chartered body. Nobody is forced to accept low salaries, and if "Menenius" does not care to work for the sums he mentions, it is clearly open to him to leave it alone.

Again, solicitors are in very many instances servants to public corporations and public companies, but the Incorporated Law Society does not step in and say what the remuneration of the members must be. It leaves these questions to be settled between employers and employed, and the Institute of Chemistry must be contented to do the same. Your correspondents seem to forget that as a chartered body the Institute is new, and some time must be allowed for them to settle down in their new estate.

I am somewhat in accord with your correspondent "A Country Fellow." I believe we have not got the right men on the Council, and would hail with pleasure any sensible project for putting the right men in the right place.—I am, etc., ANOTHER COUNTRY FELLOW.

## THE CHEMICAL IMPOSTOR.

*To the Editor of the Chemical Trade Journal.*

Sir,—In reply to a correspondent, you say, "we have not yet heard of 'the impostor' in the Manchester district." I believe he intended calling some nine or ten months ago, whether he got there or not, as I furnished him with the funds for the journey.

Sunbrowned, threadbare, and spectacled, he called here and told a pitiful tale about having lost a situation at Levinstein's, owing to a prolonged attack of typhoid fever. He wanted work, but of a kind I couldn't give him. His name was Marks; he was a German or else a Maltese, and incidentally produced photos. of some members of his family. I paid for his dinner and gave him his fare to Manchester. From there he was going home if unsuccessful in getting work. Would I give him my address so that he could write to me from home? I carelessly handed him a sheet of note paper with my printed address at the head of it.

The next I heard of him was from Glasgow, through the agent of the Charity Organisation Society, who wrote to ask me if I knew anything about him, as he was making use of what purported to be a testimonial from me!—I am, etc.,

Borough Laboratory, WM. ACKROYD.
Crossley Street, Halifax.

# Trade Notes.

THE TINPLATE CORNER.—Last week, a meeting of the tinplate makers was held in Swansea, at the Mackworth Hotel, to consider their position. On all sides there was a disposition to have nothing to do with the tin syndicate, the impression having gained ground that were the makers to join, they would in reality be playing into the hands of the capitalists rather than be improving their own position. Finally, the members decided to form a committee to compare the different schemes advanced and to report at an early date.

SOUTH WALES COAL EXPORTS.—Owing to the unfortunate strike in the northern coalfield, Newcastle and district has had to yield the palm to South Wales in the matter of coal exports. In the year 1887 no less than 7,516,894 tons of coal were exported from Cardiff, while 1,192,807 tons were sent coastwise, making a grand total of 8,709,701 tons, being an increase of 844,868 over the exports of 1886. From Newport 2,293,276 tons were sent to foreign ports, and 1,126,857 tons coastwise, or a total of 3,420,127. From Swansea 869,019 tons were sent abroad, and 737,323 coastwise, altogether 1,606,342 tons. The four Welsh ports shipped nearly as much coal last year as the whole of the twelve shipping ports on the east coast, or 13,923,877 tons, as against the east coast shipments from the Tyne to the Humber of 15,655,997.

THE SCHOOL BOARDS AND TECHNICAL EDUCATION.—The London School Board, last week, after a long debate on a memorial from the Birmingham School Board, decided to take part with a number of provincial School Boards in a deputation to the Education Department to urge the re-introduction of a Technical Education Bill at the earliest moment possible next session, on the principle of the Scotch Act. A deputation was appointed, including the Rev. Joseph Diggle, chairman of the London School Board, and Sir Rd. Temple. A resolution was also carried that a number of members of parliament be asked to accompany and support the deputation.

PHYLLOXERA.—Official returns just published, show that the phylloxera is spreading at an alarming rate in Austria. During last year the area of the infected districts in Lower Austria was twice the size of that infected in 1884.

Nitro-Explosives.—We take the following abstract of the paper on picric acid, to which we recently alluded as having been read by M. Berthelot to the French Academy of Sciences, from the *Chemical News*:—The author describes the variety of the modes of decomposition of the nitro-compounds, properly so-called, and how they depend on the initial temperature of the decomposition. In cases where the surrounding medium presents a mass large enough to absorb the heat as it is produced, there ensues neither deflagration nor detonation. However, if a nitro-compound, such as picric acid, when burning in the air in a large mass, heats the side of the vessel to such a degree that deflagration commences, this may contribute to raise still further the temperature of the recipient, and the phenomenon is sometimes ultimately converted in detonation. If this takes place at one isolated point, as in a fire, or by the local overheating of a boiler or other apparatus, an explosive wave is generated, and is propagated by influence through the entire mass, producing a general explosion.

Oil as Fuel.—The coal production of the world is about 400 millions of tons, of which England raises 157 millions and the United States 106 millions. The oil supply at present visible amounts to but 30 millions of tons per annum; but it is a growing industry.

Patent Fuel.—It appears that South Wales shipped no less than 227,895 tons of "Patent Fuel" in 1886, and 258,382 tons in 1887. This manufacture would require about 26,000 tons of coal-tar pitch.

The Widnes Waste Heaps.—At the last meeting of the Widnes Local Board the following letter, dated the 17th ult., was read from Messrs. Oppenheim and Malkin, solicitors, St. Helens, in response to an inquiry of the Board as to their opinion on the subject of waste heaps:—"Such deposits as these are in our opinion clearly nuisances within the meaning of section 91 of the Public Health Act, 1875. They need not be injurious to health to enable magistrates to convict (Bishop Auckland Sanitary Authority and Bishop Auckland Iron and Steel Co., L. R. Q. B. D. 138). In our opinion, however, in consequence of amongst other things the saving words in sub-section (1) of the proviso attached to section 91, summary proceedings would not afford an adequate remedy, and we advise that proceedings should be taken under section 107 in the High Court of Justice to enforce the abatement or prohibition of the nuisance. The Attorney-General would be a necessary party to these proceedings (see Wallasey Local Board *v.* Gracey, L. J. R. 56, ch. D. p. 739)." The chairman pointed out that at the last meeting instructions were given for legal opinion to be obtained on the subject, so that if it was found necessary to go to law they might know their position. It was now for the board either to appoint a deputation or committee to confer with the depositors, to see if some satisfactory arrangement could not be come to, or to decide to take legal action at once. He considered that to pursue the latter course would be extremely objectionable, for they had all to live together as man and wife, and, however objectionable in the case of a man and wife one might be to the other, a *modus operandi* had to be found whereby to carry on. He thought the better plan would be to appoint a committee. However, he was quite open to hear anything that the members of the board had to say, and to act on whatever the majority might think ought to be done.

The Copper Ring.—"The Rio Tinto Company has just concluded (says the *Statist* of last week) an arrangement with the Société des Métaux, by which the latter company undertakes to buy at a fixed minimum price all the copper produced by the former which it is unable to sell at a higher price to purchasers. The agreement is to last for three years, and is highly favourable to the Rio Tinto Company, which has received security for the carrying out of the stipulations, besides the financial strength of the Société des Métaux. American companies have entered into a similar arrangement, and the Mason and Barry Company was expected late yesterday afternoon to intimate its adhesion to the agreement. At the time of writing, however, we have not received information as to the result of the directors' meeting, but little doubt is entertained that the Mason and Barry will join with the Rio Tinto and the American companies. The Tharsis Company, on the other hand, refuses, for the present at least, to come into the agreement, and so likewise does the Cape Copper Company. The French syndicate, with the support of the American companies and the two great Spanish companies, believes that it is now master of the situation, and that it will be able to control the market for at least three years. Those who are interested in Rio Tintos assure us that the bargain is so highly favourable to that company that the shares are sure to go higher. All will depend, of course, as we have said on a former occasion, upon the strict fulfilment of the arrangement. If the syndicate is able to carry out its part of the contract the price of copper will be maintained, if not at the present price, not much under, and the price of copper shares will naturally rise. Then, for a considerable time at any rate, it seems clear that the production cannot be so materially increased as to affect the price, it being understood that about 40,000 tons of copper are already locked up by the syndicate."

The Herring Curing Industry.—During the past year the herring curing industry seems to have been in a bad way. The returns of the Fishery Board of Scotland give the following statistics:—

| | | | | |
|---|---|---|---|---|
| 2,228,524 cwt. Yield, 891,410 barrels, costing | | | | £420,694 |
| Add expenses of curing and sending to Russia, thus:— | | | | |
| Barrel | £0 | 3 | 0 | |
| Gutting and packing | 0 | 1 | 0 | |
| Salting | 0 | 2 | 0 | |
| Branding | 0 | 0 | 4 | |
| Coopering | 0 | 0 | 9 | |
| Rent and Cartages | 0 | 0 | 9 | |
| Freight and dues | 0 | 2 | 1 | |
| Commission and charges abroad | 0 | 2 | 1 | |
| 891,410 barrels, at | £0 | 12 | 0 | =534,846 |
| *Proceeds.* | | | | £955,540 |
| 222,852 barrels full herrings sell at 29s. | | | £323,135 | |
| 663,558 do. matie herrings sell at 16s. | | | 534,846 | |
| | | | | 857,981 |
| Leaving as probable loss to the curers | | | | £97,559 |

The correctness of this estimate seems corroborated by the fact of one or more of the Scotch banks having written off large sums to cover losses made by advancing money to the curers.

Lecture on Lighthouse Illumination.—Under the auspices of the Owens College Union, Professor H. B. Dixon recently delivered a lecture on the subject of the recent lighthouse experiments at South Foreland. Originally, the lecturer said, candles were used for lighthouse illumination. These gave place to oil. In 1860 the electric light was introduced at South Foreland. Soon after its introduction, as Professor Dixon explained, the French authorities took up the subject and proposed to spend £300,000 in putting up electric lights round the whole of the French coast. About the same time the Commissioners of Irish Lights began the use of gas in their lighthouses. An angry controversy arose as to the comparative merits of gas, oil, and the electric light for lighthouse purposes, and many hard things were said on the one side and the other. The Board of Trade appointed a committee to carry out experiments and decide between the rival lights. As the committee could not come to any agreement, the Board of Trade asked the Trinity House to undertake the experiments. The Trinity House agreed to do so, and Professor Dixon was invited to undertake the photometric work. For the purpose of the experiments three lighthouses were erected side by side, and the best arrangements that could be thought of were adopted to secure the accuracy of the tests. The gaslights, it was found, gave more light than oil, and a very close race was run between the two best gaslights that were tried. The Argand burners of Sir James Douglas, Wigham's cluster of burners, Sugg's regenerative burners, and Siemens' burners were experimented with. On the whole the Argand principle had the best of it. But of all the lights tried the electric was found to be incomparably the most intense. The experiments proved that in all sorts of weather it could penetrate further than gas or oil. So brilliant and penetrative were the rays of the electric light that while it was better adapted than any other light for a wide open position, it was too dazzling for use in narrow channels. One result of the experiments had been that the French had not persevered with their big scheme of electric lighting. The Irish Commissioners, however, had continued putting up gaslights, and one of the brightest lights in the world was a gaslight which had been put up on the north-west coast of Ireland. The English believers in oil or gas were dissatisfied with the experiments. Each of the parties to the controversy appeared to hold its views with as much tenacity as ever. The lecture was illustrated by a number of interesting experiments.

Fatal Result of the Explosion in Glasgow.—Richard Armour, 18 years of age, residing at 27, Tureen-street, one of the three men who were burned by the explosion in the colour-works of Messrs. Robert Fulton and Co., 159, London-street, Glasgow, has died in the Royal Infirmary. The other two are progressing favourably.

WEST CALDER SHALE MINERS.—A meeting of the West Calder and Hermand shale miners was held in the Assembly Room, West Calder, last week. There was a good attendance—Mr. Alex. Leitch, president, in the chair. It was stated that all the miners had got the promised 2d. per ton of advance, but as no advance had been conceded to the oncost men, it was suggested that they should also ask for a rise. The nine hours from bank to bank was also being well attended to by the men, most of them working on this principle. Mr. Wilson, miners' agent, Broxburn, addressed the meeting, and pointed out that the oil prospects were brighter now than they had been for some years. He advocated organisation, and said it was by such means that they would be able to look after their own interest. It was agreed by a large majority that each each man should subscribe a sixpence per week to the West Lothian Miners' Association, to put it on as firm a basis as it was before the strike.

THE PROPOSED RING IN TINPLATES.—Last week, Staffordshire tinplate makers were informed by Welsh firms that Mr. James Spence, chairman, had left London for Paris, to further negotiate with the Paris syndicate concerning the resolve to form a tinplate syndicate. The proposal is that the Paris syndicate shall send over £250,000 to buy up all Welsh plates likely to come on the market at anything below 15s. Probably 400,000 boxes will have to be bought up. No doubt is entertained that the Paris syndicate will advance the money. American merchants will not buy.

CONFESSIONS OF A COMPANY PROMOTER.—In the London Bankruptcy Court, last week, a meeting was held for the examination of Mr. E. A. Harrison Ainsworth, whose liabilities were given as £2,154, and assets £110, being the estimated value of certain shares in public companies of the nominal value of £55,000. In reply to questions, the bankrupt said in 1885 he promoted a company called the Universal Contract Corporation (Limited), which was to purchase his business. He signed the memorandum of association for one share, and six other persons, practically his nominees, signed for one share each, he paying the necessary money. The company contracted to purchase his business for £140,000. Three of his nominees were at that time directors of the company. Shares of the nominal value of £120,000 were allotted to him and his nominees. He subsequently received from the company £20,000 in cash. He was appointed perpetual chairman of the company, at a salary of £5,000 a year, and received it until shortly before the winding-up order was made, about fifteen months after the formation of the company. A dividend was declared, and he received £20,480 in cash in respect of shares held by himself and his nominees. The bankrupt admitted that practically he was the company. In round figures he had received £60,000 in cash from the company, which was now being wound up. Various schemes had been promoted by the Universal Contract Corporation, all of which, with three exceptions, had gone into liquidation. The business of the company had failed through adverse comments in financial papers and other causes. The examination was adjourned.

THE ALUMINIUM WORKS AT OLDBURY.—There is now being erected at Oldbury, by the Aluminium Company Limited, an extensive works, which will form an important new trade for the district. At these works will be carried on the manufacture of sodium, under the recently-discovered Castner process, and its conversion into aluminium under the patents of Mr. James Webster. The company has a share and debenture capital of half a million sterling, and it has already works at Solihull, warehouses in Birmingham, rolling mills at Sheffield, and a warehouse in St. Mary Axe, London. The works at Oldbury occupy 4½ acres of ground, and they will be capable of producing £300 worth of aluminium per day. There will be four furnaces, each with five chambers, for the manufacture of sodium, and a number of other furnaces, which have yet to be erected, will be used for making chloride of aluminium and the aluminium itself. The furnaces will be fired by eight Wilson gas-producers. The gas from these will be carried to the furnaces through pipes, and as there will be a separate valve to each furnace, the supply of heat will be regulated without difficulty. It is expected that the works will be in operation by March. One of the chimneys, which is 150ft. high, with an internal diameter of 6ft., is already completed; and another, 180ft. in height and 8ft. across the top, is about half built.

A GERMAN ANILINE COMPANY.—At the general meeting of the shareholders of the German Joint Stock Aniline Manufacturing Company it has been decided to call in the 5 per cent. loan and to issue 4½ per cent. mortgage bonds to the amount of £125,000.

## CROWN ROYALTIES.

MR. PRITCHARD MORGAN sends the following letter to *The Times*:—

"Sir,—The question of royalties to the Crown is to my mind one which requires immediate consideration. I have refrained altogether from expressing any opinion until I ascertained the position which the Crown officers would assume. I have been honoured with a visit to the mine of those gentlemen who have the responsibility of advising the Crown upon such subjects.

The prerogative of the Crown is clear. They are entitled as a matter of legal right to all the gold and silver found in our various possessions. Special terms and concessions have been granted to the Australian Colonies, and there they are entitled to dig for the precious metals upon the payment of a sum of 10s. per annum per man interested in the industry. No such concessions have ever been made in the case of gold mines situated in the United Kingdom, nor indeed has any necessity arisen until lately for modifying the law.

In the case of private lands the Crown have not, it is said, any right of entry, and the owner of the soil is entitled to search for gold, and, when he has found it, it belongs to the Crown, and the Crown then gives him a proportion, reserving a proportion for themselves which they call a royalty; but whether, if the Crown has the right to the precious metals, they have the right of entry to search for the metals is a question upon which I offer no opinion. That may be a matter for the serious consideration of the Crown law officers. They having a right to the metals, it should follow that they have a right to enter and search for them. Then, it would be natural to assume that that right might be assigned or a licence given by the Crown to A. B. to enter upon the lands of C. D. and search for gold. Other legal objections may then arise, such as the failure to find the precious metals; and that may be deemed in law to have been a trespass on the part of the Crown—whereas if the precious metals are found, the Crown would have been justified in making an entry.

It is in the interests of gold-mining generally that I write. I have no fear that I shall be unfairly dealt with; but all gold-miners resident in England will agree with me that it is an anomaly that a British subject should be allowed to search for gold in Australia and keep it if he finds it; whereas if he finds it in England, he has to do so necessarily at his own expense, and when he has found it, give a proportion of it to the Crown. There may be isolated instances, such as for instance the discovery of £60,000 worth of gold at the Clogan Mine some years ago, and such as the discovery of a considerably larger amount latterly at Gwynfyndd Mine, in which a royalty would not be a prohibitive tax; but taking gold-mining as an industry, if an expenditure of 90 oz. of gold will produce 100 oz. of gold, it is clear that that would be a remunerative industry, but a royalty of $\frac{1}{20}$th, or 5 oz. of gold, would be equivalent to the Crown saying "You gold-miners carry on the industry at your own expense, running all the risks yourselves, and give us half of the profit." Whereas—and the history of gold-mining clearly demonstrates that not more than 5 oz. out of 100 oz. would be profit—the Crown would be taking the whole of the profits without running any risk.

These are questions respecting which all persons contemplating the employment of labour and the expenditure of capital in Wales are in considerable doubt.

It is only within a short time, I think a year or two, that the Crown relinquished a right which doubtless has retarded to a material extent gold-mining in Wales—viz., a claim for one-fourth of the amount of money for which any gold property changed hands in England—that is to say, if a man took up Crown lands and expended £800 upon them and sold again for £1,000 the Crown would claim £250 from him, and, although he made a profit on the transaction, it would result in a loss of £50.

## COMMERCIAL ENTERPRISE AT CARDIFF.

PROPOSED IMPORTATION OF PETROLEUM.

CARDIFF is apparently attracting to its confines a variety of commercial undertakings which are a sure indication of the advanced position it is rapidly assuming as an industrial centre. Its unrivalled geographical advantages, combined with the fact that it is the most accessible port for the accommodation of that vast stream of commerce which converges from the St. George's and the English and the Bristol

Channels into the Atlantic, appeal very strongly to the sympathy of merchants to whom nowadays a couple of days saved in a voyage mean all the difference between profit and loss. Some such considerations must weigh heavily with a syndicate of gentlemen who have formed the scheme of making Cardiff one of the principal, if not the chief, of the petroleum importing ports in the United Kingdom. We understand that a site has been acquired in the Ely Harbour on the Victoria Wharf, where it is stated that large storage tanks will be erected for the reception of the oil when imported. Mr. Robert Johnston, provision and produce broker, of John-street, Cardiff, is the secretary of the company, which will be consolidated in the course of a week or so. Our representative was informed that Messrs. Tellefsen, Wills and Co., the well-known shipowners of Cardiff, had already fitted out some of their vessels with the necessary tanks for the conveyance of the petroleum, but inquiry from Mr. Tellefsen elicited the information that the company were not interested in the speculation, though he personally is.

For many years past, Pennsylvania, Central and Lower Alleghany, Butler, and McKean counties in the United States have been noted for their gigantic product of this mineral oil, but of late the Caspian and the Black Sea have gained considerable notoriety on account of the petroleum wells which abound in that locality. It is evident that steamers going to the Danube or lower Mediterranean ports with cargoes of coal, could very cheaply convey oil from the districts above-named, especially as they would return direct to Cardiff. In the region of the Caucasus and on the Caspian Sea, where other fuel is scarce and dear, and petroleum is plentiful and cheap, the latter is used with complete success on both steamships and locomotives. Some such idea has often presented itself to engineers and others in this country, but so far it has had no practical demonstration. It is believed, however, that the new Cardiff company do not contemplate the furtherance of any such project, but desire to make their premises a central depôt for the storage and distribution of the oil for domestic and other similar purposes. As a lubricant, crude petroleum and the heavy distillates therefrom have been slowly winning their way with consumers for several years, and when properly prepared, they are found to be possessed of great endurance, to be free from a tendency to "gum," and to be incapable of spontaneous combustion. No doubt the promoters of the new enterprise will turn their attention to this valuable commercial quality of the oil.

# Queries and Replies.

Oil of Vitriol Crystals.—In reply to your correspondent, I have during the last frost met with large icy crystals at the bottom of carboys of vitriol, and on analysing them, found them to consist of 84·4 per cent. of real oil of vitriol ($H_2SO_4$) and 15·6 per cent. of water, this gives the formula for them of $H_2SO_4.H_2O$.—Works Chemist.

Strength of Ammonia.—I can quite see where "Dyer" is perplexed. The two glasses he refers to are well known in the Manchester district as Casartelli's and Mottershead's; or, as I have sometimes heard them called the Lancashire and Yorkshire glasses, respectively. Ammonia of 0·880 is reckoned as 28° on Casartelli's glass, and indeed the 24° and 18° are reckoned on this latter glass. Only just lately I have compared these glasses with the following results:—

| Sp. Gr. | Mottershead. | Casartelli. | % Ammonia. | Trade term. |
|---|---|---|---|---|
| 0·882 | 35° | 28° | 36·0 | 28's |
| 0·908 | 30° | 24° | 25·8 | 24's |
| 0·930 | 24° | 18° | 18·4 | 18's |

A Manufacturer.

Soda Crystals and Caustic Soda.—Are these being actually made anywhere from ammonia-soda?—Chemical Broker.

Potash Alum.—Is there any potash alum in the market, or can any of your readers inform me whether it is all made from ammonia as a general rule?—Calico Printer.

Chlorates.—Which is the best for a printer to use, potash or soda? What is the advantage of using soda?—Calico Printer.

Weldon Mud.—On page 102 of *Gas Journal* of 17th inst. it is said that Weldon mud can be used *in a liquid form* instead of iron oxide. This would be extremely important in sulphate of ammonia manufacture. What is the cost of this mud, and where can it be got? A short article on this point by the editor would be valuable.—$NH_3$.

## OPIUM CULTIVATION IN PERSIA.

MR. PRATT, the United States Minister at Teheran, in a recent report states that opium occupies the first place in the foreign trade of Persia. It insures the largest and most direct cash return to the producer, and, as a natural consequence, the area under cultivation is increasing greatly. The two principal markets are Hong Kong and London. In 1886, 4,993 chests, worth £374,475, were exported from the ports in the Persian Gulf, exclusive of what was sent away by land routes, or was consumed in the country itself. The quantity of morphia contained in Persian opium is 11½ to 12 per cent., while in other opium-producing countries it rarely exceeds 9½ per cent. The *papaver somniferum*, or white poppy, of which opium is the inspissated juice, is grown principally in and about Ispahan, Yezd, and Shiraz, that of Ispahan being superior both in quality and quantity. The preparation of the land begins about September 5, and consists in ploughing, harrowing, fertilising abundantly with ashes and detritus, and laying off into squares to facilitate irrigation. After sowing, the fields are irrigated three times, at intervals of fifteen days. After that there is only one more irrigation—about the middle of the winter. In the spring, irrigation takes place on March 20, after which the land is repeatedly harrowed and hoed in order to extirpate all parasitic weeds. The plants are thinned, and then watered every ten days until flowering begins, when all work must cease. When the heads have formed and have fully ripened a last flooding is given. Then six slight incisions are made at about the junction of the stem with the head. This should be done at noon. The juice that exudes is collected the next morning and the morning following at daybreak. When these first incisions have ceased discharging others are made lower down, and the operation may be thus thrice repeated, the opium obtained after each successive incision being proportionately inferior in quality. Next the plants themselves are cut down and the heads sold, the natives using the seed on bread as a substitute for butter. The end of May is the season for harvesting. Mr. Pratt thinks that there are in California and the Southern States extensive regions adapted, both climatically and from the nature of the soil, to the successful cultivation of the opium-yielding poppy, and in view of the superior qualities of Persian opium he recommends the Persian method as the safest guide for experimenting with poppy culture in the United States.

## INCOME TAX ADJUSTMENT.

ON the recommendation of the executive committee of the London Chamber of Commerce, the Council of that body at its last meeting adopted the following report for communication to interested parties:—

"The following facts, which do not appear to be generally known to merchants and others in the City of London, will be found to be of general interest and importance. The return for income tax under schedule D for trade profits is, as is well known, based upon the average of the annual profits of the three preceding years. For instance, the returns last made in June, 1887, payable in January, 1888, are of the annual profits of the years 1884-5-6. Now, the law expressly provides that if the profits of the year for which the return is made prove to be less than the average thus found, and also less than the average of the three years including the year in which the return is made, the latter average can be substituted for the former if it be to the advantage of the taxpayers. If the income tax has been already paid before the amended return is made, the difference will be refunded by the Crown. To take an instance, suppose a business to have shown the following profits:—1884, £1,000; 1885, £900; 1886, £800; the average returned last June was of course £900, tax payable January, 1888, at 7d.—£26. 5s. Suppose, now, that on the 31st December last the house in question finds, on balancing their books, that their profits for 1887 amount to only £700, it is in their power to send in an amended return, in which the profits for 1884 are omitted and those for 1887 substituted in the calculation of the average. Thus the amount becomes £800 (the average of £900, £800, £700); income tax payable, £23. 6s. 8d. If this result is ascertained only after the tax on £900 has been already paid, as must be the case with a house balancing at end of January or later, the Crown is bound to refund the difference—£2. 18s. 4d. This power of amending a return,

important though it is to the taxpayer in a period of falling profits, is not to be found indicated among the numerous instructions upon the income tax paper, nor does there seem hitherto to have been any means by which the knowledge could be acquired by the ordinary taxpayer except by a laborious examination of the Income Tax Act and the various amending Acts. The Crown, acting upon a disputed and apparently very doubtful view of the law, refuses to recognise amended returns made more than one year after the expiration of the year of assessment. Their right to do so will shortly come before the law courts, and upon the legal point we, of course, express no opinion. But the merchants of the City of London can form their own judgment upon the way in which advantage has been taken of a legal doubt to refuse performance of what among men of business could not be regarded as other than an honourable obligation. The Crown admit that in many cases income tax has been overpaid, but refuse to refund on the sole ground of the expiration of time for giving notice. But we are not aware that they have in any case considered themselves precluded from demanding underpaid amounts beyond a similar limit of twelve months. It is needless to point out the effect which such an example may have in a case where the Crown has to rely so largely upon the good faith and honour of the taxpayer."

## THE RECOVERY OF TIN AND COPPER FROM OLD DYEBATHS.

THE waste water from dyeworks is a very complicated mixture of salts, containing both in suspension and in solution, chromium, copper, tin and other metals, besides a very varying quantity of organic matter, both tinctorial and non-tinctorial.

With these last we have but little to do in the present article, it being only our desire to show the practical dyer how he can extract the rarer metals, and so cease to pollute the streams and watercourses with them.

In the laboratory the process is no secret, and is a very simple one, it is only the application of the process to the large scale that requires attention to details. By preference the copper liquors should be kept apart from the tin liquors and treated separately; but this is not absolutely necessary, as a mixed precipitate of copper and tin is still of high value.

The waste baths should be collected in a large tank, large enough in fact to hold two days supply, and in which has been placed some zinc clippings, an article readily obtainable in the proper quarter. The contents of the tank should be kept agitated for some time—a few hours—and afterwards allowed to settle, so that the precipitated metals may fall to the bottom of the tank. The clear liquor must then be run off, the tank filled up again, and the operation repeated as before, adding zinc clippings as they dissolve away. After a time the precipitated metals will have accumulated to such an extent that they must be removed and allowed to drain and dry. The utilisation of this precipitate is clearly beyond the sphere of the dyer, but there would be no difficulty in finding a market for it.

Considering the enormous rise in the prices of both tin and copper, the foregoing process seems to recommend itself to the users of these metals, copper having advanced from £38. 10s. to £76, and tin having risen from £102 to £150 per ton.

## A RELIC OF THE PAST.

LAST week, Mr. F. H. Pickles, of Fairfield, Manchester, kindly lent us an old document, being instructions from the late Dr. John Dalton to Mr. R. Rumney, of Ardwick, how to perform the operation of the estimation of tin in alloys. Had it been possible to reproduce the letter by photozincography we would have done so, but it has not been possible owing to its aged and stained character. The instructions are:—

"To estimate the quantity of tin in alloys or other compounds:—

The principle on which the estimation is made is based on the property which protochloride of tin possesses of removing chlorine from every body capable of yielding it. If, therefore, we pour a solution of perchloride of iron (a salt of a reddish yellow colour) into protochloride of tin (a colourless salt) the salt of iron gives up to it one equivalent of chlorine, causing it to pass to the state of perchloride (a colourless salt), and will remain in the liquor in the state of protochloride of iron (also a colourless salt).

Formula: $Fe_2 Cl_3 + Sn Cl = 2 (Fe Cl) + Sn Cl_2$.

The decolouration of the salt of iron will therefore go on so long as the salt of tin requires more chlorine, but so soon as the protochloride of tin is completely converted into perchloride the least drop of the solution of the persalt of iron will strongly colour the test liquor, and thus indicate the completion of the operation. If the solution of perchloride of iron be made of known strength we know the quantity of tin tested.

For this purpose we take—say 25 grains of the matter to be analysed, and introduce it into a mattrass sufficiently large, say one pint, with a mixture of one part of nitric acid and six parts of hydrochloric acid, it will be vividly attacked by boiling for a short time, or until the liquor assumes a yellow colour and has a powerful odour of chlorine.

The tin is now dissolved in the state of perchloride. Zinc is then to be added until the liquor becomes clear, colourless and limpid, The zinc in dissolving causes the tin to pass to the state of protochloride, *i.e.*, it precipitates it in the metallic state, but the excess of hydrochloric acid immediately redissolves it and retains it in the liquor in the state of protochloride.

The solution of perchloride of iron of known strength is now added from a graduated burette, until a slight colour appears, and the proportion of tin is determined by calculation. A little water should be added to the liquor to be tested.

To prepare the perchloride of iron, dissolve by boiling for a few minutes peroxide of iron or colcothar in pure hydrochloric acid, and filter immediately. This solution may be kept any length of time for use. JOHN DALTON."

Our readers will see that the simple addition of an indicator renders the process accurate for to-day.

## BENZOIC ACID IN MILK.

BY FR. M. HORN.

THE milk sold in Vienna* is sometimes mixed with benzoic acid in order to preserve it from curdling. Meissl's process is very well suited for a qualitative analysis, but is erroneous when applied quantitatively. The following method has been proved to give good results:—To 10—15 grammes of the well mixed sample of the milk, there are added 10 to 15 c.c. of distilled water, and just enough diluted hydrochloric or acetic acid (1 to 100) to cause it to curdle upon heating. Boil, filter, and well wash the deposit with warm water. The filtrate, which must be clear, is evaporated on the water bath to near dryness and afterwards treated with (40 to 50 %) alcohol. Filter and well wash with diluted alcohol.

To the filtrate now add two or three drops of ammonia, expel the excess by boiling, filter if any cloudiness arises, and add absolute alcohol, so that the solution contains about 50 per cent. of it. Now add, drop by drop, a dilute solution of copper sulphate, by which means the light blue copper benzoate is precipitated.

The separation is complete if the solution has been completely neutral and alcoholic. The precipitate is then well washed with alcohol in a filter, dried at 100° C, and the copper benzoate $Cu(C_7H_5O_2)_2$ weighed.

For a more exact determination, remove the precipitate as much as possible from the filter, calcine, moisten the copper precipitate with strong nitric acid in a porcelain crucible until it attains a bright red heat, after which weigh the oxide of copper so formed. It is also open to the operator to reduce the benzoate to metallic copper or to form the cuprous sulphide.

For the qualitative test it suffices to agitate the alcoholic filtrate with ether, and to evaporate the same in a shallow glass dish, covering the dish with another furnished with ground edges. By this means the characteristic vapours of benzoic acid arise and become deposited on the upper dish. This appearance occurs even when only the faintest traces of benzoic acid are present, while at the same time the peculiar smell of the benzoic acid serves as another proof of its presence.—*Journal für Chemische Industrie.*

* And many other places also.—ED. *C. T. J.*

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

There has been no very marked change on any section, but the general tendency has been towards relaxed quotations, soda crystals dropping 6d., and bleaching powder and caustic soda (cream) showing perceptibly weaker. Sulphate of ammonia has remained stationary at about the height lately gained, but since the week opened there has been something of a fall in the air, although it is not easy to say precisely what shape it is taking. There is a belief in some consummated business under £13, but as yet no general acquiescence in a drop has been accorded on the part of holders of the article, most of whom still nominally quote the top figure to-day. The neglect from which the makers of bichromates suffered a fortnight ago has been partly amended, and during the week, orders have been coming in much more freely, bichromate of soda being most in request, as formerly. Values being fixed artificially by makers in combination, do not vary with a varying demand. Chief prices current are:—Soda crystals, 41s. net Tyne; alum, £5 less 2½ % Glasgow; borax: English refined, £31, and boracic acid, £46 net Glasgow; soda ash, 48/52°, 1d. less 5 % Tyne; caustic soda, white, 76° £8. 5s., 70/72° £7. 60/62° £6. 1s. 3d., and cream, 60/62° £6 less 2½ % Liverpool; bicarbonate of soda, 5cwt. casks, £5. 15., and 1cwt. casks, £6 net Tyne; refined alkali, 48/52° 1⅛d. less 2½ % Tyne; saltcake, 21s. 6d. less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15. to £7. 17s. 6d. less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d. less 5 % and 6 % to Scotch and English respectively; nitrate of soda, 9s. 6d. to 9s. 9d.; chlorate of potash, 6½d. less 5 % any port; sulphate of ammonia, £12. 17s. 6d. to £13 f.o.b. Leith; paraffin scale, hard, 2½d., soft, 2d.; paraffin wax, 120° semi-refined, 3d., and re-melted, 2½d.; paraffin spirit, 6d.; burning oil, 6d. to 7½d.; lubricating oil, 885° £6. 10s. to £7; sulphate of copper, £21. Western imports for the week include 10,295 tons iron ore, 2,690 tons pyrites, 120 tons gypsum, 100 tons borax, and at Greenock of sugar arrivals, seven cargoes.

## THE LIVERPOOL MINERAL MARKET.

There is little change to report in the market this week. Manganese: Arrivals have been practically nil, and stocks are low, but there are several parcels afloat. Magnesite (containing 98 per cent. of carbonate of magnesia): More inquiry, but prices are unaltered at 30s. to 35s. for raw lump. Bauxite: Still in good demand at 20s. for lump; seconds, 16s.; thirds, 12s. Dolomite: 7s. 6d. per ton at the mines. French Chalk: Prices are unchanged at 80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate): Best quality particularly still continues scarce, and prices are firm. Selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s. Sulphate unchanged: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-stone continues in fair demand for good qualities; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore still stronger. Bilbao and Santander: 7s. 6d. Irish: 10s. Purple ore: 6s. Emerystone steady at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fluor and felspar quiet. Fullers' earth steady, 45s. to 50s. for best blue and yellow. Wolfram and tungstate of soda quiet without change in prices. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore has still improved in demand, and prices are stronger. Antimony ore, £8 to £10 for fair quality. Uranium: 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 18s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel: 20 %, £4. 12s. 6d. Silicon spiegel: 9 %, £8. Chrome pig: 9 to 10 %, £8 to £8. 10s. Bitumen: Finest picked, £35; original prime, £18 to £23; and good, £8.

## THE LIVERPOOL COLOUR MARKET.

Colours remain steady. Ochres: Oxfordshire £10, £12, £14, and £16; Derbyshire 50s. to 55s., Welsh (best) 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C.. 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £17. Red lead, £16. Oxide of Zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d.; Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto lb. jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## THE ALKALI MARKET.

Prices do not mend as time drags on, and there is a greater tendency to weakness. The glut of soda, which makes its presence felt more and more every day, is becoming a serious question from which some manufacturers are endeavouring to escape by increasing the quality and the value of their production. By and by there will be so little profit, even in caustic soda, that makers will cease to buy salt to fuse, and to find drums for it and give to their customers free of charge. They have yet to learn a lesson from ammonia-soda. It is stated on good authority that a small ammonia-soda works is to be started near Accrington shortly.

Bleach has shown a weaker turn, and there have been some rumours of another 10 per cent. restriction of the output, though we cannot get any confirmation of the story.

## MISCELLANEOUS CHEMICAL MARKET.

The changes during the week are mostly in the direction of lower prices, in sympathy with general dulness of trade.

Sulphate of ammonia has given way, and can be obtained 5s. to 7s. 6d. below last week's quotations. Muriate of ammonia and salammoniac are slow of sale, but prices are nominally unaltered. Nitrate of soda on the spot is steady.

Sulphate of copper is rather easier, but quotations are irregular. Prices range from £21. 10s. to £22. 10s. according to seller. Lead, litharge, nitrate and acetate of lead are the shade easier. Tin, and tin salts are unaltered.

Soda-ash and crystals in Lancashire and Tyne districts are without any marked changes. Caustic soda is 1s. 3d. to 2s. 6d. per ton lower. Bleaching powder is in fair demand. Acetates of lime is more freely offered, but prices are firmly maintained. Acetate of soda can be bought a shade under recent prices. Coal-tar products are still meeting with a good sale—but Benzol is reported weaker. Potash-carbonate, and caustic are in good demand, but prices are just the shade lower.

## THE SULPHATE OF AMMONIA MARKET.

After reaching £13 at London, Hull, and Leith, sulphate of ammonia has experienced a reverse. We are afraid that the demand of £13. 2s. 6d. at Leith, was "the straw which broke the camel's back." Rather than pay this price, speculators who had transferred their business from Hull to Leith in order to weaken the Hull market, suddenly held aloof, with the result that the Leith sellers were anxious to let go at any price.

The situation is good however, stocks are low, and there is not any inordinate quantity offering, so that unless sales are now made for forward delivery at lower prices than are now ruling, the market will soon come round again, as continental consumers must shortly appear with extensive orders.

The continental producers have done better than their English confrères. Most of them have sold forward till June, at a price equal to £13. 1s. 3d. at Hull, or £13. 5s. at their works.

Prices to-day may be said to be £12. 12s. 6d. at Hull and Leith, and £12. 16s. 3d. London. Beckton is offering at £13, but parcels of outside makes may be had on Beckton terms at £12. 16s. 3d. for prompt delivery.

## THE TAR PRODUCTS MARKET.

The weakness which commenced last Tuesday amongst benzoles is now beginning to make itself felt, and it may safely be said to-day that there is no price for benzol; purchasers, or would-be-purchasers on the Manchester market would not name a price they would give, and several were anxious to sell. It is an awkward feature when sellers have to ask what prices the purchasers will offer them. At present it seems a struggle between the large German consumers on the one hand and the English speculators on the other. The German consumers say naturally there has been no substantial change since just over a year ago, when benzol was selling at 1s. 6d.: it is true the distillers have had to pay a little more for their tar, but that has been more than compensated for by the advance in solvent naphtha, creosote, carbolic acid, and anthracene. So far, this is true; but pitch has stood at such an absurdly low figure that this must be reckoned in also. Carbolic acid (crude) is, if anything, a shade weaker, but the demand for creosote for burning purposes still continues good. Pyridine continues to move off slowly. We notice a shipment of two drums from Grimsby, and the s. s. *Winsloe* and *Ophelia*, on the 13th instant, took seven drums, valued at £378, to Rotterdam and Hamburg, from the port of London.

Several tar contracts of some magnitude are soon to be let; and, under the existing conditions and state of the market, we await their settlement with more than the usual degree of interest.

## Gazette Notices.

### PARTNERSHIPS DISSOLVED.

Stollery & Palmer, Fann-street, London, leather agents and factors.

Rushton & Bradburn, Liverpool, engineers and millwrights.

E. Stacey & Sons, Sheffield, Britannia metal and electro-plate manufacturers.

Lever & Large, Atherton, Lancashire, brick and tile makers.

G. Hollins & Son, Manchester, leather merchants, as regards G. Hollins.

E. Forshaw & Son, Warrington, boiler makers.

A. Mitchell & G. S. Mills, under the style of The Food Antiseptic Company, London, manufacturers of frigiline and other chemical substances.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Volk, Magnus, Brighton, electrical engineer.

Doughty, William Hall, (trading as the Yorkshire Paint and Colour Co.), Kingston-upon-Hull, colour manufacturers.

#### First Meetings and Public Examinations.

Strafford, Joseph, & Strafford, George Henry (trading as J. Strafford & Co.), Wath-on-Dearne, Yorkshire, glass bottle manufacturers. January 30, Official Receiver's Office, Sheffield. February 9, County Court Hall, Sheffield.

Egleton, Robert Tanner, London, oil and colourman, and oilman's valuer. Feb. 1, Bankruptcy Buildings, Portugal-street, Lincoln's-inn Fields. Feb. 10, 34, Lincoln's-inn Fields.

#### Adjudications.

Bailey, Joseph, Brentor, Devonshire, Mill Bay Docks, Plymouth, mine proprietor and manganese merchant.

#### Notices of Dividends.

Bethell, Charles Ithell (separate estate), Weybridge, tar distiller and creosoter of timber, trading with F. P. Koe, as John Bethell & Co. First and final dividend of 15s. 4d., Jan. 25, or any subsequent day, 41, Coleman-street, E.C.

Koe, Frederick Pemberton (separate estate), Blackheath, tar distiller and creosoter of timber, trading with C. I. Bethell as John Bethell & Co. First and final dividend of 5¾d., Jan. 25, or any subsequent day, 41, Coleman-street, E.C.

Sewell, John, Sunderland, varnish manufacturer and oil merchant First and final dividend of 7s. 10¾d., Feb. 1, Official Receiver's office, Sunderland.

## New Companies.

Alboline Oil and Varnish Company Limited.—Capital, £25,000 in £1 shares.

Andaluzia, Iron, Coal and Steel Works Company Limited.—Capital, £1,200,000 in £10 shares.

Belgian and Colonial Flexible Metallic Tubing Company Limited.—Capital, £60,000 in £10 shares.

Bentong "Straits" Tin Company Limited.—Capital, £100,000 in £1 shares.

Bass, Ratcliffe and Gretton Limited (Brewers). — Capital, £2,720,000 in £100 shares.

Eastern Counties and British Farmers Condensed Milk Company Limited.—Capital. £100,000 in £5 shares.

Flameless Explosives Company Limited.—Capital, £150,000 in £1 shares.

Great Crosby Brick and Terra Cotta Company Limited.—Capital, £30,000 in £1 shares.

House to House Electric Supply Company Limited.—Capital, £350,000 in £5 shares.

Joseph Robinson and Company Limited (Cement Manufacturer).—Capital, £100,000 in £5 shares.

Kilbourn Refrigerating Machine Company Limited.—Capital, £16,000 in £1 shares.

## The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Safety Fuse for Blasting.** F. J. Shand. 542. (Complete specification.) Jan. 13.
**Cotton-Seed Oil Foots.** R. Hunt. 547. Jan. 13.
**Purification of Cotton-Seed Oil.** R. Hunt. 550. Jan. 13.
**Asbestos Tipped Lamp Wicks.** E. R. Morris and C. P. Small. 551. Jan. 13.
**Kilns for Drying.** R. Free. 562. Jan. 13.
**Indicating Strength of Brine.** W. Bodenham. 564. Jan. 13.
**Manures.** F. J. R. Seaver. 571. Jan. 13.
**Stoppers for Bottles.** H. P. Capreol. 576. Jan. 13.
**Lamp for Photographing.** T. H. Redwood. 582. Jan. 13.
**Steam Generators.** B. H. Thwaite. 594. Jan. 14.
**Aerothermic Motors.** L. Genty. 600. Jan. 14.
**Preparing Fullers' Earth.**—(Complete specification.) C. R. Dames. 603. Jan. 14.
**Filtration of Water in Quantity.** W. A. Nicholl. 606. Jan. 14.
**Treatment of Acid Tars from Mineral Oils.** C. Rave. 607. Jan. 14.
**Preventing Explosions in Oil Stoves.**—(Complete specification.) C. Trench. 613. Jan. 14.
**Bottle Stoppers.** J. Tabrar. 615. Jan. 14.
**Joining Lead Pipes.** F. Jewell and W. Mark. 621. Jan. 14.
**Ornamenting Vitreous Surfaces.** A. Jones. 622. Jan. 14.
**Combustion of Liquid Hydrocarbons.** W. R. Chinnery and P. Tarbutt. 624. Jan. 14.
**Gas Lamps.** C. M. Walker. 628. Jan. 14.
**Conveying Molten Glass to Moulds.** W. S. Simpson. 636. Jan. 14.
**Fuses for Projectiles.** Baron Armstrong. 641. Jan. 14.
**Extracting Juice from Sugar Canes.** E. Easton and S. Hoyland. 642. Jan. 14.
**Indelible Ink.** C. P. Dimitry. 648. Jan. 16.
**Coal-Getting Machinery.** S. S. Skipton and O. Y. Rhodes. 655. Jan. 16.
**Thermo-Dynamic Engines.** James Hargreaves. 656. Jan. 16.
**Rotary Pumps.**—(Complete specification.) J. W. Briggs. 660. Jan. 16.
**Safety Fuses.**—(Complete specification.) W. Bennetts. 666. Jan. 16.
**Fusible Cements.** M. Mackay. 667. Jan. 16.
**Extract of Tea.** G. C. P. Cooper and R. W. Leftwich. 668. Jan. 16.
**Disulpho and Dicarbo Acids of the Diamidoazo-Benzidines.** L. Paul. 676. Jan. 16.
**Distemper Colours.** J. Nipper. (Complete specification.) 678. Jan, 16.
**Glass Tiles and other Glass Articles.** J. Haley. 679. Jan. 16.
**Anti-corrosive Composition for Iron and Steel.** W. C. A. Holzapfel. 683. Jan. 16.
**Casting Metal Ingots.** J. Illingworth. 686. Jan. 16.
**Separation of the Isomeric Naphthylamine Sulphonic Acids.** C. D. Abel. 687. Jan. 16.
**Igniting Apparatus for Gas Engines.** C. D. Abel. 688. Jan. 16.
**Nickel and Cobalt Extraction.** A. M. Clark. 692. Jan. 16.
**Treatment and Final Disposal of Sewage.** W. Blizzard. 693. Jan. 17.
**Treatment of the Phosphate of Alumina.** C. F. Claus. 700. Jan. 17.
**Measuring and Distributing Liquids.** G. A. J. Schott. 702. Jan. 17.
**Chlorate of Potash Pellets.** F. Wyley and W. F. Wyley. 708. Jan. 17.
**Galvanic Batteries.** T. Coad. 713. Jan. 17.
**Gas Producers.** J. Noble. 715. Jan. 17.
**Regenerative Furnaces.** J. Noble. 716. Jan. 17.
**Self-Renewing Electric Batteries.** E. Guitton. 718. Jan. 17.
**Charging and Drawing Gas Retorts.** J. West. 723. Jan. 17.
**Thermo-Dynamo Electric Machines.** R. Kennedy. 727. Jan. 17.
**Recovery of Sulphur from Alkali Waste and Utilisation of the Residue.** Harry Grimshaw. 728. Jan. 17.
**A New Agglomerated Fuel.** E. Schoop. 737. Jan. 17.
**Tanning Hides by Electricity.** L. A. Groth. 742. Jan. 17.
**Paper Barrels.** A. Brab. 745. Jan. 17.
**Refrigerators.** T. J. Rayner. 761. Jan. 18.
**Recovery of Tin from Tinned Metal.** M. N. D'Andria. 767. Jan. 18.
**Oxygen from Atmospheric Air.** H. Tipping. 788. Jan. 18.
**New Process for making Objects of Copper.** P. Jensen. 814. Jan. 18.
**Domestic Water Heater.** B. Verity. 817. Jan. 18.
**Drying Tea.** A. H. B. Sharpe. 824. Jan. 18.
**An Improved Combination of Metals.** W. Kington. 826. Jan. 19.
**The Abatement of Smoke.** H. J. Newcome. 833. Jan. 19.
**Oxygen and Nitrogen from Atmospheric Air.** E. Baudouin, Ellice-Clark, and L. Chapman. 857. Jan. 19.
**Manufacture of Ice.**—(Complete specification.) A. Conacher and O. L. Williams. 860. Jan. 19.
**Automatic Extinguishers for Lamps.** E. G. Leeman. 862. Jan. 19.
**Manufacture of Pigments from Copperas and other Iron Compounds.** A. Crossley, W. Prodham, P. P. Mosley, and W. H. Haynes. 870. Jan. 19.
**Evaporation of Ferrous Sulphate and other Solutions.** A. Crossley, W. Prodham, P. P. Mosley, and W. H. Haynes. 871. Jan. 19.

# PRICES CURRENT.

[THURSDAY, JAN. 2

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

*The values stated are F.O.R. at maker's works, or at usual ports of shipment in U.K. The price in dif localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 9 | 9 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 3 | 0 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 4½ |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 10 | 0 |
| ,, ( ,, 150°) | ,, | 1 | 17 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 6 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 7 |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 13 | 9 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 15 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 16 | 3 |
| ,, ,, (grey), Hull | ,, | 12 | 12 | 6 |
| Aniline Oil | per lb. | 0 | 0 | 10 |
| Aniline Salt | ,, | 0 | 0 | 9 |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 15 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 10 | 0 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, | per unit per cwt. | 0 | 1 | 3 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 9 |
| ,, 50/90 ,, | ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2 |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 6 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 3 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 75 | 0 | 0 |
| ,, Sulphate | ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 70 | 0 | 0 |
| Glycerine (crude) | ,, | 33 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 16 | 0 | 0 |
| ,, Litharge Flake, ex ship | ,, | 15 | 15 | 0 |
| ,, Acetate (white) | ,, | 28 | 0 | 0 |
| ,, ,, (brown) | ,, | 21 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 0 | 0 |
| ,, Nitrate | ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 17 | 6 |
| ,, (grey) | ,, | 14 | 5 | 0 |
| Magnesium (ribbon and wire) | per oz. | | | |
| ,, Chloride | per ton | | | |
| ,, Carbonate | per cwt. | | | |
| ,, Hydrate | per cwt. | | | |
| ,, Sulphate (Epsom Salts) | per ton | | | |
| Manganese, Sulphate | ,, | | | |
| ,, Borate | per cwt. | | | |
| ,, Ore, 70 % | per ton | | | |
| Methylated Spirit, 60° O.P. | per gallon | | | |
| Naphtha (Wood), Solvent | ,, | | | |
| ,, ,, Miscible, 60° O.P. | ,, | | | |
| **Oils:—** | | | | |
| Castor | per cwt. | | | |
| Cotton-seed | per ton | | | |
| Linseed | ,, | | | |
| Lubricating, Scotch, 890°—895° | ,, | | | |
| Petroleum, Russian | per gallon | | | |
| ,, American | ,, | | | |
| Potassium (metal) | per oz. | | | |
| ,, Bichromate | per lb. | | | |
| ,, Carbonate, 90 % | per cwt. | | | |
| ,, Chlorate | per lb. | | | |
| ,, Cyanide, 98 % | ,, | | | |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | | | |
| ,, ,, (Caustic Potash) 75/80 % | ,, | | | |
| ,, ,, (Caustic Potash) 70/75 % | ,, | | | |
| ,, Nitrate (refined) | per cwt. | | | |
| ,, Permanganate | ,, | | | |
| ,, Prussiate Yellow | per lb. | | | |
| ,, Sulphate, 90 % | per ton | | | |
| ,, Muriate, 80 % | ,, | | | |
| Silver (metal) | per oz. | | | |
| ,, Nitrate | ,, | | | |
| Sodium (metal) | per lb. | | | |
| ,, Carb. (refined Soda-ash) 48 % | per ton | | | |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | | | |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | | | |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | | | |
| ,, ,, (Soda Crystals) | ,, | | | |
| ,, ,, (Crystal Carbonate) | ,, | | | |
| ,, Acetate (ex ship) | ,, | | | |
| ,, Chlorate | per lb. | | | |
| ,, Borate (Borax) | per ton. | | | |
| ,, Bichromate | per lb. | | | |
| ,, Hydrate (77 % Caustic Soda) | per ton | | | |
| ,, ,, (74 % Caustic Soda) | ,, | | | |
| ,, ,, (70 % Caustic Soda) | ,, | | | |
| ,, ,, (60 % Caustic Soda, white) | ,, | | | |
| ,, ,, (60 % Caustic Soda, cream) | ,, | | | |
| ,, Bicarbonate | ,, | | | |
| ,, Hyposulphite | ,, | | | |
| ,, Manganate, 30/33 | ,, | | | |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | | | |
| ,, Nitrite, 98% | per ton | | | |
| ,, Phosphate | ,, | | | |
| ,, Prussiate | per lb. | | | |
| ,, Silicate (glass) | per ton | | | |
| ,, ,, (liquid, 100° Tw.) | ,, | | | |
| ,, Sulphate (Salt-cake) | ,, | | | |
| ,, ,, (Glauber's Salts) | ,, | | | |
| ,, Sulphide | ,, | | | |
| ,, Sulphite | ,, | | | |
| Strontium Hydrate, 98 % | ,, | | | |
| Sugar, Beet | per cwt. | | | |
| ,, Cane | ,, | | | |
| Sulphocyanide Ammonium | per lb. | | | |
| ,, Barium | ,, | | | |
| ,, Copper (pure) | ,, | | | |
| Sulphur (Flowers) | per ton | | | |
| ,, (Roll Brimstone) | ,, | | | |
| ,, Brimstone: Best 3rds (L'pool). | ,, | | | |
| Superphosphate of Lime (28 %) | ,, | | | |
| Tallow | ,, | | | |
| Tin (metal) | ,, | | | |
| ,, Crystals | per lb. | | | |
| Zinc (Spelter) | per ton | | | |
| ,, Chloride (solution, 96° Tw.) | ,, | | | |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, February 4, 1888.**


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Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

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## DISEASE AND DISINFECTANTS.

IF we have a Defoe or a Manzoni amongst us, we shall find chronicled at some future time the details of the various epidemics which have affected our large towns this year and last. King Fever has had his Jubilee as well as our Most Gracious Majesty Queen Victoria, and now that pageant with all its tinsel has passed away, it leaves us face to face with our insanitary conditions, and to fight with King Death for supremacy over neglected laws of health. Englishmen are very apt to look upon their land as the centralisation of health, and the general freedom of this country from epidemics has helped to make us regard them as really belonging to other shores. We have not had a repetition of the epidemic known as the "great plague" since the days of Defoe, that is with such virulence, but who can say that the germ which did such mischief then is not alive amongst us to-day, and only waiting for a good *nidus* in order again to show its power over organised material, and to teach us at the same time how little power we have in reality over the venomous microbe.

All this results from the equable temperature of our climate; we very seldom have excesses, either in summer or in winter, and it is very seldom indeed that we have to cry out from a scarcity of water. What would be our case had we an Indian temperature (99° F. to 103° F., with a humidity of 73 per cent. of saturation) of two or three months' duration, and without rain? What would be the state of our "slums" when under ordinary conditions they are insanitary enough to foster serious epidemics? Can we go to any large town without finding colonies of such places? What is to be done with them? The question may as well be put to the Sphinx as to our Local Governing bodies.

It is quite certain that neither the Great Plague of London as described by Defoe, nor the graphic account of the Milan pestilence given by Manzoni, has made that impression upon us that it should have done, and so we go living along in a fool's paradise, that when epidemics come amongst us we turn up our eyes in astonishment.

Our habits and our general mode of living have wonderfully altered of late; our towns have, through a long period of depression attracted labourers from the country, who have come in to swell the already long list of half-fed seekers after employment. Half-fed, often upon unsuitable food; half clothed, and still more badly housed: this is the pabulum upon which King Fever sows his deadly microbe.

And, this is not all;—as if to war against any too rapid emancipation of human beings from the ills which disease brings more or less to all, we have constructed a network of sewers in and about our towns, which certainly in most cases tends to prevent over-population. Most of these sewers are open to the street, still more open direct into our dwelling-houses, where they shower their gases and vapours, infection and microbes, upon young and old alike.

We are now, of course, referring to untrapped drains and and other household conveniences; and from our own actual experiences in Manchester and Salford, we can say with confidence that by far the majority of sanitary drains are either absolutely untrapped or the work has been executed in such a way as to be ineffectual.

Even supposing things to be done in a proper manner there are people so filthy in their habits that they deserv to be ostracised immediately on discovery as the skunk o society at large. Recently, Mr. Hawkes, the coroner for Birmingham, held an inquest on the body of a married woman named Ellis, who lived in a court in Camden-street. The evidence showed that deceased died of consumption, but that she had suffered from neglect. The house in which

deceased, her husband, five children, and a lodger lived was in a disgracefully filthy state, the floors being a quarter of an inch thick in dirt. The deceased, it was stated, was covered with dirt. These conditions in any large town are a constant source of danger.

We have had now raging for months a fever epidemic in London; measles and scarlatina have pervaded our provincial towns; smallpox has been and is even now raging in Sheffield; and is spreading to Nottingham and surrounding towns, and the modern science of medicine does not seem to have yet found the smallest loophole wherein to insert the point, even, of the lever of prevention. What is the condition of Sheffield to-day as described by the daily press? "The atmosphere is laden with disinfectants; the sewers drenched, almost choked with carbolic acid; and the cabs, omnibuses, and tramcars have the odours of druggists' shops."

This is how *The Times* describes the condition of London:—"Yesterday morning the total number of patients remaining under treatment had been reduced to 1,954, of which 1,789 were scarlet fever cases, three typhus, 154 enteric fever cases, and eight cases of other diseases. The Asylums Board had, yesterday, 791 scarlet fever beds available."

Disinfectants are here employed *ad nauseam*, but if the users of them fancy the "microbe" will be frightened away while a pabulum of dirt lies underneath, we fear they have not learned the first sanitary law, which states that "cleanliness is next to godliness."

We take it for granted, and we fancy that no one will attempt to gainsay our supposition, that the nidus of epidemical diseases is to be found in insanitary dwellings and influences, and therefore the first step to be taken is in the direction of improved sanitation. Sanitation does not mean the purchase of a few hundred tons of bleaching powder, or a thousand tons of manganate of soda wherewith to scour the sides of sewers; but it does mean a careful attention to details, and to use every means to ensure that the individual, be he poor or be he rich, is not a source of danger to his neighbour.

It is the workman who has been neglected in this country, their houses are far too small to enable the workers in dirty and unwholesome trades to cleanse themselves with any amount of decency. The very nature of their work makes them careless and languid, so that when they reach home only partial ablution is undergone. Why should not the owners of all large and even small establishments, build baths for their workpeople, so that the dirt and matter foreign to the human body might be left in the establishment wherein it was obtained?

But turning aside from this question, of which we may have more to say anon, we desire to point out that all disinfectants do not disinfect, any more than all that glitters is not gold. Of late years there have sprung up a number of substances to be used for the purposes of germicides, the inventors thinking, perhaps, that the possession of a powerful odour is quite sufficient for the purpose. Evidence on the fitness of chemical substances for use in disinfecting is of a very conflicting character, and therefore we say, trust more to the supply of pure air and pure water, the former for breathing and the latter for ablution, which if strictly carried out would render another allusion by *Mr. Punch* to the Darwen collier's visit to Blackpool unnecessary.

---

Failure of Ironworks in France.—At a Cabinet Council held last week, the Minister of the Interior explained the circumstances in which 300 men were placed in the departments of Loire and Gard owing to Terrenvire and Besseges Ironworks Company having suspended payment. The Minister announced that a receiver would be appointed by the Tribunal of Commerce.

## HIGH STRENGTH CAUSTIC.

At the present time there seems to be a large and increasing demand for high strength caustic soda. Owing to the competition with the ammonia-soda process, the Leblanc process feels it is not able to hold its own, so far as soda-ash or carbonate of soda is concerned, and therefore for some time past the Leblanc makers, or those of them who possessed a greater insight into the future than others, have turned their attention to the manufacture of caustic soda. It is not long since that the Greenbank Alkali Co. was the only firm in the world making a substantially pure caustic soda, the 60 per cent. and 70 per cent. always containing a large amount of impurity. The following analyses will show the average composition of the kinds at present in the market:—

| | Red liquor cream. | Vat liquor cream. | 60 per cent. white. | 70 per cent. white. | Caustic bottoms. | High strength. |
|---|---|---|---|---|---|---|
| Water ..... | 9·0 | 12·3 | — | — | — | — |
| Insoluble ..... | ·2 | — | — | — | 23·0 | — |
| Sodium chloride ..... | 6·8 | 7·8 | 15·1 | 3·9 | 6·1 | 1·3 |
| ,, sulphate..... | 1·5 | 2·2 | 3·6 | 3·4 | 5·5 | 1·5 |
| ,, sulphite ..... | 1·5 | 0·1 | — | — | 0·2 | — |
| ,, silicate ..... | 2·1 | 0·2 | 0·1 | 0·3 | 0·7 | 0·1 |
| ,, aluminate ... | 0·8 | 1·3 | 0·4 | 0·2 | 5·6 | 0·2 |
| ,, carbonate ... | 3·1 | 1·4 | 1·1 | 2·4 | — | 0·2 |
| ,, hydrate ..... | 75·0 | 74·6 | 79·8 | 89·6 | 58·6 | 96·0 |

The sample of "high strength" caustic was made by the Greenbank Alkali Co., and was analysed at the time they were sole makers of this article. It tested 74 per cent. of total alkali by the ordinary test. Soon after this, a Widnes firm commenced the manufacture of the article, and they succeeded in producing a very good quality. Now, however, a step in advance is said to have been made by the Newcastle Chemical Works Co. Limited, who have succeeded in producing on the large scale a 77 per cent. caustic, which, if this statement be true, cannot contain less than 99 per cent. of pure hydrate of sodium.

After all, the manufacture is no secret, and might have well been taken up by the older caustic soda makers had they not been rigid bodies moving in a straight line. The saltcake used in balling must be strong—containing less than 0·5 per cent. of Na Cl—the vatting must be done at as low a temperature as possible, the sulphides should be removed before causticising with oxide of zinc, and the sulphate of sodium perfectly removed by fishing and settling, and perhaps partially cooling. The saltcake is the most critical point of the whole, for if a moderate amount of chloride finds its way into the liquors there is no known method of getting it out again, as ordinary liquors boiled to 88° Tw. will, on cooling to 52° F., still retain about 30 grammes of chloride of sodium in the litre, associated with about 580 grammes of hydrate of soda.

The manufacture is one that requires great care and attention to details, and where there is real supervision and rule of thumb not rampant, there should be no difficulty in making 99 per cent. hydrate of soda.

## ON THE WANT OF HOMOGENEITY OF THE THOMAS PIG IRON.

A Hint for the Correct Drawing of Samples.

by C. REINHARDT.

On the edge of the cross section of the pig, the phosphorus and manganese are almost invariably greater than in the middle. In the case of slowly chilled grey iron, there has been found in each cross section of the pig, sometimes a higher and sometimes a lower proportion of manganese and phosphorus, but these rise and fall equally with each other, so that in the case of the lowest phosphorus we find the lowest manganese also; while on the other hand, in the case of the highest phosphorus we have the highest manganese.

In the examination of an entire section, that is to say of each central layer of the pig, the phosphorus and manganese of all sections are at the edge higher than in the centre, while the phosphorus is certainly very irregularly distributed in

various layers, and at the same time the manganese omes richer as we go from layer to layer.
a rapidly cooled pig the phosphorus is not only higher he top, but also on the entire outer service.
rom the foregoing the following rules may be useful for wing samples. Samples taken when the pigs still lie in r bed are more to be depended upon. They may be en by striking through the central pig of the central bed, he central pig of the first, middle, and last bed, and ob- ing several cross sections, while a piece is split off in a gitudinal direction by means of a heavy hammer. The ves of the pig most suitable for striking off, splints are y secured in a heavy wooden frame, and pieces broken off h a hammer from the middle as well as from the edges, ich are united in equal quantities, or each sample is kept arately and broken up in so-called diamond mortars. The rse iron powder is now separated by means of a hair e of 1·5—2·0 m.m. mesh, and afterwards through a brass e with thirty meshes to each c.m of length. In drawing nples from piles or stacks one can remove sample pigs m above, below, the centre, right and left, treating them above, taking care at the same time to remove sandy ces from the sample splints.—*Rep. Anal. Chem.* 1877, vii., 2.

## SOLUBLE GLASS.

OLUBLE glass, or silicate of soda, is a substance largely used in the arts and manufactures. It is employed for ing with soaps and sizes, and enters very largely into the nposition of the enamels with which white and coloured cks are coated. There are many other uses for it, and refore we will explain to our readers how it is made.
Two hundredweights and three-quarters of 50 per cent. la-ash are fused in a furnace with 3½ cwt. of silver sand. er some time the two substances will combine to form a ssy mass weighing 5½ cwt., carbonic acid being evolved. is operation consumes about 3 tons of fuel for every ton glassy silicate produced, and the labour and wear and tear y safely be put down at about eighteen shillings per ton.
This glassy silicate has the following composition:—

| | |
|---|---|
| Soda | 26·66 |
| Sodium chloride | 1·20 |
| ,, sulphate | 1·71 |
| Alumina | ·72 |
| Silica | 69·68 |
| | 99·97 |

This silicate is extremely hard and difficult of solution, so at purchasers usually require it in solution. To this end is steamed with water in dissolving vats until it forms a ution of 100° Tw., the quantity already mentioned making it over 12 cwt. of well settled solution.
A solution of 140° Tw., such as was formerly sold, is of the lowing composition:—

| | |
|---|---|
| Water | 44·3 |
| Soda | 18·8 |
| Sodium chloride | 1·2 |
| ,, sulphate | 1·3 |
| Silica | 32·6 |
| Alumina | ·6 |
| | 98·8 |

e glassy silicate in dissolving partly decomposes, depo- ng a certain amount of silica, so that if the glass is required making the solution, we would advise the fusion of a ture of 3¾ cwt. of silica with 3¾ cwt. of a 50 per cent. a-ash.

## THE DETERMINATION OF ALUMINA IN THE PRESENCE OF OXIDE OF IRON AND PHOSPHORIC ACID.

BY L. BLUM.

N determining amounts of alumina in the presence of oxides of iron and phosphoric acid many errors unfor- nately creep in, and not only does the error affect the termination when the iron is titrated with permanganate, it more especially the precipitation with ammonia. If as usually the case, the ammoniacal fluid is boiled until it nells but faintly of ammonia, then generally a portion of the muriate of ammonia has become decomposed, and the muriatic acid thus set free has partially dissolved the precipitate formed by the ammonia, so that the numbers for alumina are too low, and which cannot by any means be got to agree with the total alumina contents of the slag. This error can be obviated in the following manner:—Fifty c.c. of the acid solution filtered off from the silica are diluted to half a litre and oxidised with bromine water. Precipitation is then effected by the cautious addition of ammonia, a slight excess of this latter added, and the whole boiled for a short time without paying any attention to the excess of ammonia still present. The solution is now to be filtered, and the precipitate washed with hot water only as rapidly as possible, the lime being afterwards determined in the concentrated filtrate. By operating in this way alumina could never be found in the filtrate. In three separate laboratories fourteen similar samples of iron ore were analysed with the following results:—

| | I. | II. | III. |
|---|---|---|---|
| Alumina | 5·08 | 2·98 | 5·97 |
| Metallic iron | 33·20 | 32·99 | 32·96 |
| Lime | 15·22 | 16·23 | 14·93 |
| Magnesia | 1·11 | 1·27 | 0·86 |

The author's figures are to be found under column III.; in laboratory No. II. the very low figures of alumina were obtained in consequence of the fluid being boiled until all ammonia was expelled. In the case of No. I. the iron was titrated with permanganate. The statement by Fresenius (*Q. Chem. An.* 6 *Ed.* ii. 807) that in the filtrate from the ammonia precipitate no alumina occurs, must evidently be reconsidered.—*Journal für Anal. Chem.* 1888, xxvii. 19.

# Legal.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

MR. MOULTON'S ARGUMENT.

Mr. Moulton: May it please your Lordship, when I was addressing your Lordship on Saturday I was putting before you what I contend to be the real scientific truth on this matter—namely, that Mn $O_2$ peroxide is not an efficient agent for performing the operation described in the patent, or, rather, accomplishing the purposes of the patent, excepting when it is in combination either with hydrogen or some base, and that base may be in certain cases manganese itself. Now, my Lord, I propose to call your attention not only to the patent of the defendants, but also to the patent referred to in the notice of objections—namely, Kynaston's patent; and I shall submit to your Lordship that Kynaston was the first and true inventor of this invention—that he really did at a period anterior to Messrs. Spence's discovery make the invention in question, and took proper steps to give it to the public, and to obtain a patent for it. Now, as your Lordship has so frequently had the defendant's patent called to your attention, I propose to commence this morning by calling your Lordship's attention to Kynaston's patent, and I shall call Mr. Kynaston, and shall show to your Lordship that Mr. Kynaston had been at work at this for about three months; and I should think something like three weeks before the date of the patent he was in possession of this invention, and that he applied for provisional protection for it on the 10th August, the day before Messrs. Spence applied for theirs. Now, my Lord, you will quite understand that I am not suggesting that these were independent discoveries, so far as Messrs. Spence's was a discovery, at all—in other words, so far as they did really ascertain the agent that should be used. But in any case my client was first in taking the important step of applying for provisional protection, and as this provisional specification was therefore in the possession of the Patent Office, not only before Messrs. Spence had made any application there, but, as I think I shall be able to show, by their own evidence, before they were really in possession of a substantial portion of the discovery, for we have it, my Lord, that all their experiments were between the 8th and the 11th of August, or subsequent to the 11th, and, therefore, I think that it is, when one comes to examine the evidence, extremely doubtful whether the experiments with Weldon mud were made even before the 11th. Certainly there is very little suggestion that they were made before my client must have put in possession of the Patent Office his provisional specification. Has your Lordship Kynaston's specification?

Mr. Justice Kekewich: I have both. The one handed up

was Spence's, but, I think, Kynaston's also, and it has been before me a long time.

Mr. Moulton: Then, my Lord, Mr. Kynaston says: "The object of this invention is the manufacture more especially of sulphate of alumina free from iron, but it also relates to the extraction of ferruginous matters from other salts that will not suffer decomposition by the addition of peroxide of manganese." Now, my Lord, it has been suggested that Kynaston himself there calls the hydrated peroxide of manganese simply peroxide of manganese, but if your Lordship looks at it carefully it does not really say that. But of course if there was a salt which would suffer decomposition by the addition of an oxide of manganese it probably would suffer decomposition whether it were in the anhydrous form or in combination with something else. Then the specification proceeds, "In making sulphate of alumina solution for bauxite and sulphuric acid, sulphate of iron remains dissolved in the liquor. This, if allowed to remain, would be very prejudicial to the application of the sulphate of alumina in calico printing and other arts. To extract the iron I add freshly precipitated hydrated peroxide of manganese or Weldon mud preferably after washing with acid. This in some way combines with the iron and causes it to precipitate." Now, my Lord, I put this provisional specification before your Lordship with considerable confidence as a specimen of what the inventor ought to put in a provisional specification, and also as a specimen of the way in which an inventor works a thing out and perfects his invention before he specifies it at all. Now, my Lord, that is a perfect description of this invention, "to extract the iron I add freshly precipitated hydrated peroxide of manganese or Weldon mud preferably after washing with acid"—that will be quite purified Weldon mud. And then he goes on: "This in some way combines with the iron and causes it to precipitate." Then he continues, "If, however, monoxide of manganese" —that is pro-oxide of manganese—"or a ferrous salt"—that is as opposed to ferric—a more imperfectly oxidised salt, and ferric is more perfectly oxidised—"be present, sulphate of manganese is formed, and passes into solution. This, however, can be eliminated by adding a little bleaching powder." Therefore, if there is some peroxide present you add bleaching powder, which turns it into a peroxide, and down it goes. Then he says, "The precipitated iron and manganese material after being separated from the solution is treated with an acid, preferably sulphuric, and the iron extracted, when the manganese mud is ready for use afresh." Every single particle of Messrs. Spence's discovery, including even the reuse of the mud after it is thrown down, and including the perfect oxidation—because here, if he does not perfectly oxidise it before he uses it, he does exactly the same afterwards, because he adds bleaching powder, which perfectly oxidises it immediately after—therefore I say that, including the use of Weldon mud, and including what, not even in their complete specification, do Messrs. Spence tell the world—namely, that you must use the hydrated peroxide, and not the anhydrous—in every respect here is a perfect description, in a few words, of this discovery, and this, my Lord, is put into the Patent Office the day before Messrs. Spence put in theirs. Now, my Lord, I shall go to the complete specification, and show how completely it is worked out, and how completely this is claimed, but I shall have to call attention to the claims presently, because, as we have a patent for that, it may be important to consider exactly what these claims cover. But I want to put before your Lordship this: that here we have an unquestionable statement of the patent, in a form in which it is certainly a good discovery, because every witness agreed that this hydrated peroxide and the Weldon mud operate admirably. We have put this in the day before there is any application by Messrs. Spence to the Patent Office. Now, my Lord, leaving for a time the complete specification of Kynaston, let me pass to Messrs. Spence's. They say: "Our invention consists in producing alum and other salts of alumina with but a very minute proportion of iron and of coloured organic impurity, by digesting their solution with an oxide of manganese."

Mr. Justice Kekewich: What are you reading?

Mr. Moulton: I was reading the provisional—the contemporaneous—document. Then they go on: "In carrying out our invention we add to the alumina solution, which it is proposed to treat, a small percentage of an oxide of manganese, and then mix and digest," Now, my Lord, had Messrs. Spence made their discovery at this time? They speak simply of adding an acid. Now, my Lord, take such an oxide as protoxide—nobody suggests, or has suggested, that the protoxide would do at all. Yet the only thing they specify for is "an oxide of manganese." Now, my Lord, here is a remarkable thing; oxide of manganese means a combination of oxygen and manganese first of all. But many oxides—some oxides, at any rate—would not do; for instance, protoxide. But if I can establish to your Lordship, as I trust I shall, that a combinatian of oxygen and manganese alone is inert, and will not do at all, and that what is necessary is a combination of at least three elements, that is, oxygen, manganese, or some other base, or of hydrogen, I submit that this is not the nature of the invention, and that Messrs. Spence and Co. did not file a provisional specification stating the nature of their invention. The extent to which they had made their invention I do not know, it is difficult to tell how far exactly they had done it, but what they obviously did was, that they put in a statement wider than anything they had discovered in the hopes that they would be able thereby to base upon it some claim for an invention which contained more knowledge than they had at present, not only as to details, but also as to the very nature of the invention. Now, my Lord, I ask you just to contrast the two; one is a complete definite statement of an invention actually made, and having been made actually one which is stated, and being stated must stand the test of all future knowledge; the other is a mere vague statement of something, of not what they had attained to, but something which would cover what they had done, no doubt, if they were right in thinking that manganese and oxygen were the only two things necessary.

But how far was it a statement of the nature of their invention? They had not found that an oxide of manganese, or as they had termed it, manganese oxides, would do this. All they had done was, they had found that a certain substance thrown down containing Mn $O_2$ no doubt would work, but that was all they had discovered. They had really not made an invention at that time, but they rushed in apd took out this provisional specification. Well, now, my Lord, just let us follow what happens: Mr. Kynaston duly—for you are not obliged to give notice to proceed to get a seal immediately following your provisional specification; there is a protection, and the nature of the protection I will call your Lordship's attention to so far as it has been defined by legal authority—Kynaston went on to get his patent, and he is opposed by Messrs. Spence. What merits have Messrs. Spence to do it? What they have done is this: as soon as they got the provisional specification their patent agent gave notice to proceed, and the consequence was that Mr. Kynaston, who could not tell at all what the nature of their invention was because it was simply "Improvements in the manufacture of alum and other salts of alumina," and therefore could not know that it was a thing which he should oppose, but could only know from the title what it was, and could not tell from that possibly that it was a thing which he had to oppose—the consequence was they went on and got their seal. When Kynaston gave notice to proceed, then at the very last moment, and after they had got their seal, they lodged an objection to his patent. How was it that they could lodge an objection to his patent? Simply because he was much more clear and full in his statement of the nature of his invention. It was: "Improvements in the manufacture of certain chemicals and their purification from iron." "Purification from iron" at once struck Messrs. Spence, and they lodged a notice of objection. Now, my Lord, they succeeded to this extent with regard to the obtaining of the patent, and I shall submit to your Lordship that that success will not be sufficient for them in this action. They succeeded in virtue of a decision by the Lord Chancellor, Lord Hatherley, which would, I submit, not be binding on your behalf. It was a decision that the Lord Chancellor had a right to settle who was to have the seal or to have the patent, but on the other question of who was the first and true inventor I shall still claim my right to raise the point, that is in spite of all this Mr. Kynaston's right to be called the first and true inventor has not passed away. It was a decision which I am bound to say I think everybody has regretted since it was made, and I may mention that Lord Cairns when Lord Chancellor declined to follow it. He distinguished it, no doubt. He did not absolutely refuse to say that he would be bound by it, but in a similar case in which his *ratio deciendi* was absolutely inconsistent, he declined to take the same course. The case to which I first referred was that of *Bates* v. *Redgate*, which was fatal to Mr. Kynaston's claim.

Mr. Justice Kekewich: Where is it?

Mr. Moulton: My Lord, It is in Goodeve.

Mr. Chadwyck Healey: It is also in the authorised reports, my Lord.

Mr. Moulton: I will tell your Lordship where it is; it is in four Chancery appeals. Now, the Lord Chancellor said, "Where one patent actually exists and is brought to the notice of the Lord Chancellor, a second patent cannot be granted for the same invention. The first patentee is the possessor of all that is included in his patent," and then his Lordship goes on to say that if there is anything in the present specification which is not covered by it application may be made for a patent for that." Then he goes on to say: "If the Crown has granted a monopoly to one person it cannot in any way narrow that grant or render it inoperative by a grant of those privileges to another person." You cannot derogate from your grant—not even the Crown can do it. It simply says, "Here is an existing patent with the Great Seal to it, and I cannot grant a patent for that now." The Crown cannot derogate from its own grant.

Now, I shall submit to your Lordship, because it is a point which it is important to raise in this case; I shall show your Lordship the injustice which Bates and Redgate did, and which has been prevented by the judicature from occurring again, whether Lord Hatherley was correct in that or not it does not prevent Kynaston being the first and true inventor, and does not make Messrs. Spence, who were not only subsequent to him in the date of making the invention, but subsequent to him in the application for a patent which Kynaston duly and in proper form produced—does not make them the first and true inventors. Now, my Lord, I have read the decision of Lord Hatherley in that case, and the early part of his judgment shows that he thought the application obtained no right against the patentee whose patent had been sealed; but, my Lord, the other case in which very much the same point arose before Lord Cairns, was in *re* Dering's patent, 13 Chancery Division. There it appeared that on the 29th April the petitioner Riley had obtained a provisional protection for an invention relating to the manufacture of iron and steel. On the 25th July, 1879, Riley's patent now opposed the sealing of Dering's patent. Now, my Lord, it seems that they were very much on the same lines. The second patent was sealed, and Earl Cairns, then the Lord Chancellor, said: "The case before is not like the case of *ex parte Bates* v. *Redgate*. There is no exact precedent so far as I am aware, and so far as I am informed by those who have experience in these matters, for this case. Two applicants apply in perfectly good faith upon the same day for patents for what I may call cognate inventions, made respectively by each applicant without any knowledge of what the other was doing or had done." My Lord, that was a weaker case than this, which is one in which the application was actually made by the unsuccessful party before the one who got the seal, so that it is a stronger case than Dering's. Then, the Lord Chancellor continues "I will assume now that to a greater or less extent those inventions are identical. Before the six months are out one of the applicants succeeds in getting his Letters Patent sealed. Now, what is the position of the Crown, and what should the Crown do in such a case. *Prima facie* the Crown ought to seal both patents.

The contract with each of them on provisional protection was that he should have six months' protection. Now, if it is true that both have acted in good faith, what right have I to confiscate the invention of one because it happens to be identical with the invention of the other; again, what harm can possibly happen by the seal being affixed to both patents? If one patentee by himself or his licensee uses the invention, how can the other prevent him, what can the other say? He can only say: "You are infringing my patent." The first would reply: "I have a patent of the same date," to which the second would rejoin, "My invention was patented before yours," and this statement he can only support by producing a document bearing the same date as that of his adversary. It seems to me to be clear that neither can restrain or interfere with the other. Why should they not have become joint proprietors, etc., etc. In that case, therefore, the Lord Chancellor ordered the patent to be sealed, although there was an existing patent, which he assumed to be for the same thing.

Now, my Lord, I submit that these two decisions are inconsistent. I cannot, of course, go back and succeed in obtaining from my client a patent dated the 10th of August, as his patent has been dated 12th August, and I propose to tell your lordship how that was. On the opposition the law officer, I think Sir Henry James, considered himself bound by *Bates* v. *Redgate*, and refused to seal Kynaston's patent, dating it as on the date of the application. Then there was a reference to Dr. Odling as to whether or not the two were exactly the same. and the consequence was that the Attorney-General allowed Kynaston's patent to be sealed as on the 12th August. There is a reference to it with regard to Spence's patent, to which I shall have to call your Lordship's attention at some period in this case. Now, my Lord, what I submit is this, that the invention in the form in which it works—that is, with the hydrated peroxide—was Kynaston's invention, and that he was the first and true inventor, for not only did he invent the first, but he made application for a patent before Spence did. I shall put this dilemma to your Lordship: either hydrated peroxide is not included in Spence's patent, in which case what we include as hydrated peroxide or manganites are certainly outside Spence's patent, and then there was no infringement, or Spence's patent does include the hydrated peroxide and in that case they were not the first and true inventors of it, because the first and true inventor of it was Kynaston himself. Now, my Lord, I will just call your Lordship's attention to the 13th clause of the Patent Act, which is: "Provided also that, in case of more than one application for a patent for the same invention, the sealing of a patent on one of those applications shall not prevent the sealing of a patent on an earlier application." That was put in deliberately to prevent any such difficulty as arose in the case of *Bates* v. *Redgate*, but that is a recent Act subsequent to these two patents.

Mr. Justice Kekewich: Mr. Moulton, suppose a man discovered an invention, and there was no question that he did so, but he did not otherwise publish it, but applied for a provisional protection, and that application was bad on some technical ground, in complying with the first or second sub-section of section 5—it is immaterial what, but, upon some technical ground, at any rate, which prevented him getting his provisional protection—and then another man, quite independently and quite honestly, discovered the same invention, and does apply in proper form—say the next day, and gets his provisional protection.

Mr. Moulton: Quite so, my Lord.

Mr. Justice Kekewich: Then, after that, the first man amends or gets over his technical difficulties, and comes in No. 2—could he then say, the man who has got his specification first is not the first and true inventor?

Mr. Moulton: I will tell your Lordship how I submit it would be, supposing he got over his technical objection so far as to proceed with the original application. I will draw a distinction directly, so far as relates to the original application—he would be the first and true inventor, but if he abandons that, and puts in another, then he would not be. I admit that.

Mr. Justice Kekewich: I am not supposing that he put in another application, but was allowed to amend and put on terms for coming in.

Mr. Moulton: Then, my Lord, it would be the same thing as if it was a subsequent application. I think that would be exactly the same as a subsequent application, but in this case the application was duly made, and he failed to get his patent only because somebody applied subsequently, and as I shall submit had got the seal first when Kynaston was unable to get his patent.

Mr. Justice Kekewich: You will have another opportunity of addressing me, and I just mention that in order that you might think of it in the meantime. My difficulty in following your argument is to see how I am to go behind a date fixed by the law officers.

Mr. Moulton: My Lord, I say that we are the first and true inventors. Whether we have lost our chance and our patent is a different matter. The question is whether anybody else has stepped into the position of the first and true inventor, and I shall submit to your Lordship though I shall argue it more at length when I come to it again; I shall submit to you that the fact that my client cannot now get the patent does not enable the other person to do it, because what we do say is that we applied for a patent and applied duly, and I submit that we have not lost our priority even though the other party has got the patent.

Mr. Justice Kekewich: Supposing some of the eminent gentlemen who have been listening to this case on Saturday were struck by some combination mentioned by the ingenious counsel deeming it to be a matter of chemical importance, took Sunday to think it out, and were prepared to take out a patent, but another man on Monday morning went first, having thought of it in the meantime, to the Patent Office, and applied, could the Saturday man say, "You have got

your patent, because you got it in before me, but I thought of it before you"—could he have the prior claim?

Mr. Moulton: No, certainly not, my Lord, but what I wish to impress upon your Lordship is the date when they come and deposit their applications in the Patent Office. Of course, in this case, we are a day earlier than they are, and that is what we rely upon.

Mr. Justice Kekewich: I know.

Mr. Moulton: I say that the date of the application is the thing which decides. We have taken the step which was necessary with regard to our invention; we have taken the step which was necessary to get out a patent, and I shall submit, my Lord, of course, that *Bates* v. *Redgate* was not a sound decision.

Mr. Justice Kekewich: The result of that is this, that, in so far as Kynaston's patent differs from Spence's, Kynaston's patent was not an infringement.

Mr. Moulton: Quite so.

Mr. Justice Kekewich: It would not be then a question whether Spence was first or second, but, in so far as Kynaston has the same patent, the alteration of dates gives Spence no advantage, you say, and, therefore, the law officers' decision goes to the winds.

Mr. Moulton: Quite so, my lord; and it goes further than that. It not only gives Spence no advantage, but leaves his patent invalid, just as it would be invalid supposing the decision in *re* Dering's patent was a good one.

Mr. Justice Kekewich: Not that I am going into the details of it; but the decision of the law officer, arrived at in the way in which it was arrived at, I am entitled to look at on this question whether that which resulted from it is mere idle form.

Mr. Moulton: I submit, my Lord, that it is not conclusive on the question who was the first and true inventor.

Mr. Justice Kekewich: I understand your point, and it requires a good deal of elaboration, Mr. Moulton.

Mr. Moulton: Your Lordship sees this, that the decision with regard to granting the patent is not conclusive at all as to who was the first and true inventor. The Crown may very well say, "We shall grant Messrs. Spence their patent; they take it with all their faults," for they specially proclaim that the English law is that the grant of a patent is not conclusive of any right to that patent at all.

Aston

Mr. ~~Moulton~~: That is not the English law.

Mr. Justice Kekewich: I am listening to Mr. Moulton.

Mr. Moulton: I say, therefore, and submit that it is not conclusive against us as to whether we were the first and true inventor, though no doubt they did get that patent for it. If that patent was invalid; if we were not the first and true inventors, their patent is valid against us.

Mr. Justice Kekewich: Now we will pass on.

Mr. Moulton: Then I go at once to the patent of Peter Spence and Sons. Now, my Lord, I submit that the questions with regard to this patent are very greatly simplified by some of the frank admissions made by some of the witnesses called for the defendants. Now, there is no question whatever here as to the interpretation that the defendants seek to get put upon the claim in this patent.

Mr. Aston: That has nothing to do with you. That is for my Lord.

Mr. Moulton: I must appeal to my learned friend not to interrupt me. I said there is no doubt whatever as to the meaning which the defendants seek to get put upon the claim in their patent. I cannot see why my friend should have interrupted me when I said that. The construction they have asked to have put on this claim in the patent is this—That the meaning of the words, "The use of manganese, combined with oxygen, as a peroxide," should be extended to include the use of manganese combined with oxygen as peroxide, and in combination with other things. There is not the slightest doubt—the witnesses all admit—that the hydrated peroxide is manganese combined with oxygen and hydrogen. I shall show your Lordship presently, by means of remarks on evidence given in favour of the defendants, that manganese combined with oxygen as peroxide except in combination with something else, will not act. At all events, my learned friends are bound to ask your Lordship to hold that the use of "manganese combined with oxygen as peroxide," must include the case when you use manganese and oxygen alone, as in the anhydrous; and the case when you use it combined with lime or hydrogen, or some other thing, as in the case of Weldon mud. Well, now, I submit to your Lordship that the true meaning of this claim—I will come to the specification presently—the true meaning of this claim is that the patentees have claimed the peroxide of manganese $Mn\ O_2$ as the effective agent.

Mr. Justice Kekewich: That is what all their witnesses have said I think without the slightest exception, and without the slightest hesitation.

Mr. Moulton: That is the effect of it precisely, my Lord, and at all events if I can show, I will put it that this agent taken by itself is not effective, this claim claims more than will work, and therefore it is that I put forward to your Lordship as one of the preliminary issues of fact in this case. Will or will not $Mn\ O_2$ work when it is not in combination because there is no specific direction that it must be in combination? That is a matter no longer in controversy between us, because as your Lordship will remember Dr. Hurter directly stated that those methods would in his opinion include all possible forms of $Mn\ O_2$, and he further stated that all the methods referred to will produce anhydrous or will produce hydrated, so that the consequence is, there is no doubt whatever that this, it may be a question as to whether it claims hydrated at all there is no doubt whatever that it includes the anhydrous form.

Mr. Justice Kekewich: Where is the passage in Dr. Hurter's examination, Mr. Moulton?

Mr. Moulton: I will call your Lordship's attention to a question I put to Dr. Hurter at the end of the re-examination. I asked your Lordship's leave to put a special question to him, page 68, my Lord. Questions 522, 523, and 524. There is one question there I put to him: I put it to you with regard to the other half. You told us that this process of deoxidisation might be made to lead either to the hydrated or anhydrous form of oxidising of manganese. You would say the same thing in regard to the oxidising process, would you not?—A. Might I ask you to repeat that question. Q. 513. You told us that the result of the deoxidising process referred to in claim in Spence's patent might be made to be anhydrous, dioxide, or hydrated dioxide at will?—A. Yes, I could produce whichever I pleased. Q. 524. And you would say exactly the same thing with regard to the oxidising process?—A. Yes.

No other witness has ever been asked about it. I called special attention to it in that way, and therefore it is an admitted fact between us that those proceses which are referred to, and which they say really include their form of dioxide if you take their processes which were mentioned, might give anhydrous or might give hydrated, and as Mr. Glover very sensibly said—for it seems to me that in the latter portions of the evidence on behalf of the defendants there has been a tendency to represent this not as a chemical patent, but as a commercial patent—they called Mr. Glover and Mr. Watson Smith, and they both said, that reading this as practical men, the first thing they would try would be the native peroxide, and then probably they would go to Weldon mud. Mr. Glover's evidence I remember is specific on that point. He said: "The first thing I should try would be the native peroxide, and then I should go to Weldon mud—the two common forms." Therefore, my Lord, we have it, that in this way, with these methods given, this claim certainly includes the anhydrous. Now I shall call distinct evidence with regard to the anhydrous not working, and may I just put once more to your Lordship the position we take up, if I may put it so, chemically. What we say is that the peroxide of manganese does not combine with iron unless it is previously in combination with something which it gives up and takes the iron. If it is by itself it will not take the iron. Now, my Lord, that is not a thing that is at all strange or peculiar. If I were to take the simplest possible case of oxygen, there are things which will remain in the presence of oxygen without oxidising at all, but if there is a decomposition in which oxygen is set free the what is called nascent oxygen will instantly combine and produce oxidisation. In this way, if the anhydrous is present, it will not interfere with the iron at all, but if the anhydrous is in combination, then when it is set free like that it will take the iron and bring it down. So far from that being an occasional fact in chemistry, it is one of the greatest possible frequency that occurs. That is the position we take up with regard to it, and I want to call your Lordship's attention to some evidence which has been given by the defendants with regard to it which shows how well based our view is. I will just call your Lordship's attention to a portion of it because I do not think it will be advantageous to go through them all in detail. Would your Lordship kindly look at the last experiment made by Mr. Esilman himself. It is set out in the shorthand notes, page 145. Now, my Lord, I am on the question whether anhydrous will work, and if the anhydrous

made in one way will not work, if it is made purely, then it is clear it will not work in any way, because as I was pointing out when I last addressed your Lordship, if a vast percentage of the anhydrous being present still does not make the body effective as Mr. Pattinson said the remaining bodies which are present in the way of impurities, always excepting iron, could not prevent the action of the peroxide. If such a body will not work the peroxide will not work. I am on the question, "Will peroxide work if it is simply peroxide with nothing else in combination?" Now upon that point will your Lordship kindly look at page 145. What have we got there? We have Weldon mud first with the lime taken out; that leaves it in the hydrated, and I may tell your Lordship, as Mr. Esilman frankly told me, that the first, second, third, and fourth are all hydrated peroxides. And as your Lordship sees, practically the whole of the iron is removed by the application of the 6 per cent. which is specified in the specification. Now, my Lord, the next two are cases in which your Lordship sees a good deal more is left. They are both called anhydrous, and they are both cases in which these lower oxides of manganese were present, which we have called manganites of manganese. Mr. Esilman admitted that they were present, and, therefore, my Lord, there is not only anhydrous present, but there is another body which I will show your Lordship will work by direct evidence also present. So your Lordship will see that it cannot be attributed necessarily to the anhydrous. Now, my Lord, we will go to the next peroxide, native peroxide finely ground, and the next to that is not only finely ground, but all iron is taken out, and your Lordship sees that the amount of the iron that is not taken out of the solution jumps from 30 to 1,000 parts in the million, making it a complete failure; because this is not a question of lessening the amount of iron. In order to make this free from iron you must practically take out all. One of the witnesses said you might leave in 7 per cent of the original iron, you may take out 93 per cent. and that would do. Well, I am not going to quarrel about 1 per cent or anything of that kind; such an infinitesimal quantity would make no difference practically, but you must take it all out practically to have value in commercial processes. Here the native peroxide, which is more or less pure, and which unquestionably contains a vast proportion of peroxide, and which, if it was the agent, would work well, you will find that it jumps up, as I said, from 30 parts to 1,000 parts. So you will see it only succeeded in taking one-third of the iron out. That it should take some of it out there is no real wonder. There is no difficulty in throwing down a portion of these salts, but the question is substantially and completely to get it out, so as to give commercial value to the process. Here, as soon as they tried something which undoubtedly contains a very large proportion of anhydrous and does not probably contain any of the lower oxides, but may do so—it accounts for its working partially—the amount which you cannot take down jumps up to thirty times as great.

Now, my Lord, Tennant's recovered manganese is the last one. If your Lordship compares that with the amounts left above by the hydrated ones, which come first, you will see that the amount of iron left by Tennant's is twenty or thirty times as much as in two of them, and over a dozen times as much as in the others, even the least successful, with the hydrated peroxide. But I shall show your Lordship that the recovered manganese always does contain a considerable portion of those intermediate oxides; and the reason is this, my Lord. It is made at a high temperature, by exposing the carbonate of manganese to a high temperature to drive off the carbonic acid, and then to put the $Mn\ O_2$, that is anhydrous, $Mn\ O_2$. But that very temperature breaks up the $Mn\ O_2$ and sends some of the oxygen off, and when the oxygen is driven off it sinks back into one of these intermediate oxides, which being, as we know, manganites of manganese, will work. Now this is a case in which we have got what is called the anhydrous, but we have also got the presence of another body which will work, and we have got imperfect action. The moment we come to another body which is clearly anhydrous, and has not got certainly those other bodies present, we come to total failure. I submit to your Lordship that that is a most powerful piece of evidence in favour of the plaintiffs' case in regard to the inefficiency of $Mn\ O_2$. Let me go one step further. Supposing Mr. Pattinson is correct when he says, "I attribute it to the physical state in which the anhydrous is which prevents its working, and prevents its doing efficiently this operation." My Lord, I do not care whether it is the physical or the chemical state at all. Weldon mud is said to be in a state of finer division than the powered natural ore—the anhydrous powder. My Lord, I do not care as to that. A patentee is bound to put the public in possession of the way to work each portion of his invention that he claims without further experiment. Now, there is not one single word in this specification of Messrs. Spence which states that it is necessary in order to get this common form of peroxide to work to have triturated or ground because of its physical nature, leaving it still a powder with some degree of hardness; but even then we must expect it to work inefficiently, if it is true that the real anhydrous body is of that physical nature that it would not work, whether the cause is physical or chemical. I shall submit to your Lordship that it is chemical; but I do not care which it is for my purpose if there is any reason why it does not work efficiently, and not only efficiently, but efficiently in something like the proportions that are given on the patent. Once more, my Lord, it is not for me to be hypercritical as to the operations; but, if it will not do that, then the patentee has not told the public how to work that invention as he claims. He has claimed anhydrous and hydrated, they say. He has claimed anhydrous, but he has not told the public the way to obtain a successful result; and if he leaves anything still to experiment, his patent is still bad on that ground. Whether or not anhydrous will work when it is in the proportions or anything like the proportions stated in the specification, let us see by going to Mr. Pattinson's evidence, which is at page 96, my Lord.

On page 96, your Lordship will find I refer him to one of his experiments, and he said he took out 96 per cent. O course that would be fairly taking it all out. He took out 96 per cent of iron when he used 295 parts. In other words, roughly speaking, he took out three times as much peroxide as sulphate of alumina cake. Three hundred parts would, of course, be three times as much. The specification states six parts and therefore what he did was this: He put in 49 times, or, roughly speaking, 50 times as much as he was told in the specification to put in, and after triturating it and levigating it to reduce it to a fine powder, he did succeed in getting the iron out. Then when you come to examine the quantity of iron that there was in the solution, if your Lordship will look at the top of page 96, you will see he admits that in a fair sample of ordinary alum cake, the fair proportion of iron would be five times as strong as the solution he was using. Therefore he was using a solution which was one-fifth the strength of iron in what you would meet in a fair average sample, and had to use 50 times as much as that specification stated in order to remove that. I asked him plainly whether or not that did not mean that it was useless, and he said, yes, it did. And as soon as you have come to have 50 times as much, and a weak solution like that, nobody could say that there may not be impurities present in the shape of minute traces of these lower oxides, which in these gigantic quantities would mount up to a sufficient amount to purify that iron. But the question is, can your Lordship think that $Mn\ O_2$ is the sufficient agent in a case where when you have it practically almost pure—reduced to as fine a powder as possible by this levigating and pounding—you have to use 50 times as much as of an agent with which you take no pains whatever, namely, Weldon mud. With Weldon mud because it contains the hydrated peroxide and other manganites, the moment you try it in these small quantities down the thing goes; when you get the $Mn\ O_2$ by itself, practically you have to use these impossible quantities.

Now, my Lord, another attempt was made to explain the fact, which I think they were conscious of, that you could not really use the common cheap form of peroxide, namely, the native one. That was this: "Oh, but it contains iron." Dr. Hewitt said so, and he said, "I think it contained iron, and that was the reason." Mr. Esilman, in the very experiment that I have been quoting to your Lordship, after trying it and finding that it removed 27 per cent. purified it, took out the iron, and then he says it only took out 29 per cent. Thus its power of taking things out was very faintly improved, and therefore I submit that it was no question of the presence of iron. There is plenty of black oxide of manganese in the market with a very small amount of iron in it—very much less than peroxide of manganese will carry down for this solution, because your Lordship will see that the amount it carries down is a very considerable percentage of itself, and when you do take that out, as Mr. Esilman did, you do not find any real improvement. Therefore I submit on this evidence that, if I take the whole of the evidence and go through it there are not more than one or

two experiments in which something which may be thought to be, and which may probably be anhydrous, seems to work, and in all those cases there must be a suspicion that the lower oxides are present. We say that if the anhydrous alone is present it will not work. What I rely on as being the practical importance of this matter is this. I shall put before your Lordship careful experiments, tried under circumstances as to which there can be no suspicion of there being anything wrong in them. What I rely upon is this—that if you can get what is undoubtedly rich in anhydrous peroxide, and you do get an action, that shows that anhydrous will not do it. In all those cases, when the thing has been rich in anhydrous peroxide, and they do get it to work, they never face the difficulty as to whether it was the anhydrous or the other body which was present which did it; and I shall be able to show your Lordship, in the vast majority of cases which they cited, that there was a body present which might account for its working. On that evidence I shall ask your Lordship to find that this specification certainly claims something as an agent for effecting this operation which does not effect it. If that be so, then there is no question as to the bad patent—there is no question whatever that that would be a bad specification. Now, my Lord, just one more question. I am going—not to raise the ghost of manganic acid any more—but I am going to call your Lordship's attention to the legal consequences of its being a ghost. Here in the claim there is a distinct statement. "Whether produced for lower oxides by oxidisation or from manganic acid or permanganic acid, or their salts by deoxidation." I submit the part of what the plaintiff has claimed and intended to claim because he has said, "Not that I discovered these things, not that I have worked this out, but because I wanted to put on something which covered every single form of peroxide," is the use of peroxide of manganese produced from manganic acid as contrasted with its salts, by deoxidation. There can be no question whatever that that is the claim.

Mr. Justice Kekewich: There is no doubt about that. How he regards the matter is this, "that manganic acid does not exist as an isolated chemical fact, but some day chemical science may produce it, and when it does you may apply it according to my patent."

Mr. Moulton: I submit to your Lordship that this is not enough.

Mr. Justice Kekewich: There is no doubt that this is what he says.

Mr. Moulton: There is no doubt about what he says. I shall submit that what he has claimed is something that he has not shown how to work.

Mr. Justice Kekewich: Put it in another form, he says, "I do not show you how to work manganic acid because I cannot catch manganic acid; catch it and I will work it."

Mr. Moulton: I do not think your Lordship quite appreciates the point I put. He has to tell the public how from manganic acid to get this peroxide, because what he says is this: One of the modes of purifying iron solution is, according to his claim, the use of peroxide of manganese derived from manganic acid. Now, he has not shown the public how to get peroxide of manganese from manganic acid: then he has not shown the public how to perform that portion of his invention. Mind, it is not this, "You find me manganese acid, and I will show you how to break it up." That is not it. He has not the right then to do it. He is bound to tell the public in his specification how to do it, and he has not told the public. He cannot say chemists knew it as a matter of common knowledge, because it is obviously not a matter of common knowledge. He is bound to show to the public how they are to carry out that portion of his invention, and, as your Lordship puts it, he never gets any further than this, "You get me that, and I will show you how to do it." The answer is, "No, you cannot claim that; what you must do is that you must give up the whole of your information to the public in your specification; with your specification a person desirous of carrying out every portion of it must be able to do so."

Mr. Justice Kekewich: Supposing a man said, "There is a certain machine of which I want to have Letters Patent, I am satisfied that steel will do, I am satisfied that something else will do, and I claim that I am satisfied that wood prepared so as to resist—we will say moisture—to a certain extent, will do. I have not yet discovered how wood can be made so as to resist moisture to that extent, but if you can only make wood in that way that will do."

Mr. Moulton: Then, if he claims wood prepared to resist moisture to that extent, that would be a bad patent, I submit.

Mr. Justice Kekewich: I think this kind of illustration sometimes helps one's mind.

Mr. Moulton: Yes, my Lord, and all I can say is, that I take the burden of it upon my shoulders. It is an exceedingly good instance, because we get out of the spectre land of manganic acid into something we can really understand. Supposing a person were to say: I wish to make a machine which will, say, resist acid. If wood can be so prepared as to resist acid, then this machine can be made of wood. If there is no method known in which wood may be made to resist acid, that, I submit, would be a bad patent, because the public have a right to say: "You are going to have a monopoly of fourteen years, but it is only on the terms that you tell us clearly and fully how to carry it out." And for that there are two reasons: first of all they must know, during the period of the patent, what it is to a certain extent, because they do not want to infringe, though that relates more to the claim than the specification. But the principal ground is this: as soon as the patent is out the public must be in a condition fully to carry out the invention by knowing fully how it is to be done. Therefore, if you claim anything that you have not shown how to do, you will have had granted to you a monopoly of something which when the patent is out the people will not be able to do from looking at the specification. There could not be a better instance than the one your Lordship put, namely, that of making a machine of wood so prepared as to resist heat, or moisture, or anything of the kind, when there is no known method of so preparing it. There could not be a better instance than that of what I maintain is the case of a person claiming something wider than the claim. There are several cases upon that point, but I think it will be far better to refer to those cases at the end, because then your Lordship will have had all the facts before you.

*(To be continued.)*

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

B. B.—Rankine's Machinery and Millwork, published by Charles Griffin and Co., will be the book you require.

H. A. F.—Yes, in Spain, near Madrid.

C. D. (London).—There is no other maker in the country.

C. D. (New York).—You can get the information from the Liverpool Bill of Entry, which is £3 10s. per annum plus postage.

Menenius.—Next week.

G. G. B.—Are you quite sure you are correct in your reply.

J. H.—There was no valid reason why the price should have fallen.

$NH_3$.—We will endeavour to have an article on the subject in a week or two.

James Roman.—The index was sent out to subscribers with last week's issue, and the almanac goes out this week *to subscribers only*.

C. G. G.—The cost of the index to non-subscribers is 3½d, post free. The almanac can be supplied at 8d., post free. The volumes will soon be ready.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—After perusing the letters of all your correspondents upon this subject, there seems I think a tolerable agreement upon one point, and that is we have not got the right men on the Council, and a very strong endeavour should be made at the coming election to do as your correspondent "Another Country Fellow" suggests, namely, to put "the right men in the right place."

In order that this may be done effectually, I would suggest to those Fellows of the Institute who are at present dissatisfied with the existing state of things, that they should not send their proxies to the secretary, as they are usually asked to do, but to Mr. William Thomson of the Royal Institution, Manchester, as he has interested himself very much in this question. Of course we must expect the official party to make a good whip round for the proxies, so that it behoves all country Fellows to support Mr. Thomson's movements, by strengthening his hands as much as possible.

It is to be hoped that this exhibition of dissatisfaction will arouse the dry bones of the Institute, and that we shall be treated to a very different President's address to what we

have had in the past. Let the President tell us all what the Council means to do in the future (if anything), and help to inspire a little confidence into those who think that they have been subscribing to the funds of the Institute all for no purpose.—I am, etc., HERMES.

## THE TIPPING SYSTEM.

*To the Editor of the Chemical Trade Journal.*

Sir,—It is not clear whether the writer of the letter in your issue of the 21st ult. "Drysalter," wished us to infer that the Manchester district was the only one in which the tipping system is carried to perfection. I venture to say if he will travel on the same road as I do in Yorkshire, he will find that it is quite as hard to do business without "tips" as it is in Manchester. I do not know anything, except from hear-say of the Manchester customs, but all I can say is that if it is any worse than the Leeds district, then it must be bad. It is all very well of moralists to denounce the system, which we know is productive of the most evil results to trade, but cannot do any business without it. If the foreman or the manager does not get his usual "tip" it is a moral certainty that your chemicals will do some damage, and it is more likely than not that a heavy bill will be sent in on the strength of it, and which one is bound to allow off the account. I could tell of many instances of this sort, but will not take up more of your valuable space just now. If I find the subject is taken up by others, I may send you a few striking examples if you care to have them.—I am, etc.,

A CHEMICAL MANUFACTURER.

*To the Editor of the Chemical Trade Journal.*

Sir,—I quite agree with your correspondent "Drysalter" that something should be done to stop the tipping system now so very prevalent amongst the dyers and calico-printers of this neighbourhood, as the black mail thus levied is getting intolerable, and leads to a very great deal of adulteration of which the proprietors know nothing, as it is winked at by those users of chemicals who are the mainstay (I should have said who *ought to be* the mainstay) of their master's business. It is all very well to talk of paying a man well to keep him out of temptation, but I can assure you, sir, that very often it is the men who are well paid who levy the highest black mail. A new feature which has lately cropped up with me, is the practice of the colour mixer coming to my private house on Sunday mornings, accompanied by the storekeeper, to make complaints upon the quality of the chemicals I am supplying, telling me that he comes out of consideration to me, etc., etc., as he thought I would not like "the gov'nor" to know that things were wrong. I have, after a long experience, no hesitation in saying that the dyers and calico printers methods of buying chemicals and dyes is one of the most rotten and corrupt branches of the chemical trade in England.—I am, etc., AGENT.

*To the Editor of the Chemical Trade Journal.*

Sir,—As a manufacturer I can endorse the remarks made by "Drysalter" in your last issue anent Christmas boxes.

There can be no question as to the "Tipping" system generally being a very serious drawback to the development of our industries, and it infuses an amount of rottenness which is apalling.

What is the use of crying out for increased facilities for technical education when this degrading and retrograde policy is in force in almost every trade, and practiced by men often of recognised standing?

It is a system which must result in bad trade and open the door for foreign competition, as it encourages adulteration and an inferior class of work, rendered necessary if a manufacturer has to pay heavy bribes to his confederates.

I can speak from my personal connection with the several branches of chemical industry, and the evil is greatest in the Manchester district. It is a very common occurrence to receive letters, etc., asking for money, of which the following is a fair example:—"Your chemicals have been tested and found very satisfactory by me as foreman of the —— department, and you can expect a good order on my hearing from you," but if the £. s. d. are not forthcoming, the quality of the goods are of little importance and no business results.

It is to be regretted that "principals" take, as a rule, so little control of these matters, and are led so much by what the "men" say, and I believe that in some cases they are led to buy inferior articles through being treated to a good dinner occasionally. I have in my mind at present an old-established firm who have for some time been losing ground on account of turning out an inferior class of work than was the case formerly. I hear the principals are at a loss to account for the reason; but outside it is well known that it is the "tipping," combined with the "tippling" business (the two generally go together), which has undermined the fabric. It must inevitably tumble unless the disease is stamped out. I know for a fact that they are buying inferior and adulterated goods, and at the same time are paying 50 per cent. more than they could purchase a better article for.

I heard of an amusing and instructive case lately. A manufacturer could not understand why goods which had occasionally been supplied by a certain firm were always condemned by the workmen, as they were used regularly by other well-known firms. His suspicions were accordingly aroused, and he sent another order, and on the arrival of the goods changed the label, on which was the name of the firm, to another consignment which had just been received from the firm whose goods were always favourably spoken of. The label had the wonderful effect of changing the quality of the goods, and ever afterwards the foreman was a little more closely watched, and had less control over the buying department.

To effect a cure the following thoughts suggest themselves. The masters should avoid contact between sellers and workmen who use articles. The goods should be bought on laboratory tests, or trials made in the works under the supervision of a chemist or impartial person with required knowledge, and if after results differed, the matter should be investigated. By paying attention to this little suggestion I am confident that many firms would effect a considerable economy, turn out better work, and at the same time help to place business on a surer and more lasting basis. In fact, all persons who give or receive bribes are conniving to kill the goose that lays the golden eggs. FAIRPLAY.

# Our Book Shelf.

REPORT ON SECTION III. OF THE MANCHESTER ROYAL JUBILEE EXHIBITION: THE CHEMICAL AND ALLIED INDUSTRIES. By Watson Smith. Manchester: Emmott and Co.

This brochure of 144 pages is a reprint of the Report on the Chemical and Allied Industries recenty published in the *Journal of the Society of Chemical Industry* It is in a handy form for the pocket, and even members who have the original papers in the Journal will do well to invest in a copy, which is being offered at the low price of half-a-crown, to keep beside them for reference, the form being much more handy than in the original state.

The chief feature of this report lies in its statistical character, and as output and various other details must have been supplied by the firms in question, we have every reason to believe them to be accurate. On page 20 we notice the name of E. Porion has been transformed to Poirion. Under ordinary circumstances it would not have been necessary to notice what in all probability might have been a printer's error. But as certain members of the publication committee took upon themselves the responsibility of mutilating the patronymic of the Porion family instead of consulting those who knew, it deserves to be recorded.

PRESENT LEGISLATION ON NOXIOUS VAPOURS, WITH SUGGESTED IMPROVEMENTS. By A. E. Fletcher, F.C.S. Manchester: John Heywood.

This pamphlet is the substance of a lecture delivered by Mr. Fletcher, H.M. Chief Inspector of Alkali Works, in Manchester, under the auspices of the Manchester and Salford Noxious Vapours Abatement Association. It is very well written, very readable, and deals largely with ordinary coal smoke. The suggested improvements should find favour with every one, be he manufacturer or not

PAPER MILL REFUSE.—At a meeting of the public works committee of the Cardiff Corporation, held on Thursday last, the borough engineer presented a report bearing upon the drainage of Ely paper mills

# Trade Notes.

Truth Stranger than Fiction.—*Truth* says:—"The salt trade in Cheshire and Worcestershire has become alarmingly slack, owing to the increased development of the German salt mines, and enormous deposits of salt have recently been discovered on the banks of the Tees. A well-known London firm, which has hitherto purchased English salt, has recently bought 50,000 tons of salt in Germany, for shipment from Hamburg to Bombay." Perhaps *Truth* has some special information on this subject. If so, will he explain the rate from the mines to the seaboard?

Vaseline.—At a recent meeting in Chester Mr. Deeley said that "Sir Henry Roscoe had consulted him on the use of vaseline in the adulteration of butterine, and his reply was that vaseline being 1s. and 1s. 4d. per lb., it would not pay to use it in adulteration." Is there not some mistake here?

Beet Sugar.—With regard to the beet sugar crop on the continent, we receive from a well-informed correspondent information that so far no alteration is considered necessary in the French official statistics of December. During that month only 61 factories had been working as compared with 151 going at the same time last year. Consequently the expected deficit is confirmed. In Austria, however, the beet working has been to a large extent, and the yield has been good; nevertheless, a reduction of the estimate is neceesary by 8,500,000 cwt. There is nothing fresh reported from Belgium, Russia, and Holland, and the figures are unchanged. Reports just received from Cuba give satisfaction, although the harvesting is not as far advanced as in former years. Despatches from the West Indian Islands are favourable. During the past month the weather in Germany has scarcely been favourable to the beets, and in some places navigation has been prevented by ice. It is, however, calculated that the total German production of 1886-7 will amount to 20,376,832 cwts.

Salt, Salt, Salt.—Results now published of analysis of the waters of Great Salt Lake show that of 22·28 per cent. of salts found in it, 20·19 per cent. is common salt or pure chloride of sodium. This is all the more remarkable, seeing that the Great Salt Lake is fed by many streams so heavily charged with sulphates and nitrates of soda and potash that thirsty animals shun them. Also, the salt island in Louisiana and the salt mountains of Nevada are said to be almost absolutely pure table salt.

Fire at a Tinplate Works.—A Briton Ferry correspondent writes:—On Saturday night a disastrous fire broke out in the sorting-room of the Vernon Tinplate Works, Briton Ferry. In a few hours the sorting-room and store room were completely burnt down, and it was only with great difficulty and by persistent effort that the wash-house was saved. The fire originated in the sorting-room, and was first noticed at about half-past eight o'clock. The alarm brought hundreds of willing hands to the spot, but the fire had obtained so strong a mastery that it was impossible to save either the sorting-room or store-room. A number of men rapidly unroofed the adjoining wash-houses, and managed, after a hard struggle, to extinguish the fire. The damage cannot be estimated with any exactitude, but it must be very extensive, as there was in stock a large quantity of finished tin in boxes, besides immense quantities of boxes, block tin, plant, and other valuables. Happily, the concern was insured, and work will be resumed with little delay.

The Proposed Fusion of the Legal Professions.—A bill will, it is understood, be introduced next session in connection with the fusion of the two branches of the legal profession. The bill was introduced last year, but was too late to be read a second time. It is called the "Suitors' Relief Bill," and was backed by eight Conservative members, and provides that every suitor shall be heard, either by barrister or solicitor, before any tribunal, and that a solicitor may practise as barrister and *vice versa*.

Exclusion of Foreign Workmen in France.—An order is stated to have been issued by the management of the Compagnie Transatlantique of Marseilles, directing that no foreign workmen are to be hereafter engaged in its establishments, and that those at present in its service are to be dismissed. It is reported that the same measure will be adopted by the other French navigation companies.

The Wine Trade of 1887.—Messrs. J. R. Parkington and Co. state:—The close of 1887 shows an increase in the duty payments of 441,973 gallons wine, and 30,156 gallons spirits, as compared with 1886. A great deal has been recently written concerning the results of the 1887 vintage in France. Although the total yield only amounted to 535,332,248 gallons as compared with 551,393,500 in 1886, and 627,795,322 gallons in 1885, one most important fact has been entirely ignored, which is, that those districts producing the higher class wines, with which this country is most interested, show an increase in quantity when compared with 1886 and 1885. Commencing with champagne, there is an increase of 6,837,270 gallons and 3,168,220 gallons respectively. The yield in the claret district exceeded that of the two preceding years by 675,004 gallons and 1,392,842 gallons respectively. The quality is good and the wines are fruity, with plenty of colour and body.

Combination in the Oil Trade.—A meeting was held in Glasgow, on Monday the 23rd ult., between Mr. E. T. Bedford, of New York, as representing the American oil companies, and representatives of the Scotch oil companies, regarding the position of the trade. The conference discussed the question of production, and an estimate was made of the output of the companies in this country and in America. The idea that the quantity of oil produced should not exceed the demand to any considerable extent was favourably entertained, and the representatives of the Scotch companies promised to report favourably to their boards.

Electricity on the Underground.—The Metropolitan Railway Company is about to make a thorough trial of electricity as a motive power, and those who travel over its lines will earnestly hope that it may prove successful, and so save them much of the discomfort of the underground journey. Arrangements have been made with the Electric Traction Company for the experimental running upon a section of the railway of an electric locomotive of the same power as the present steam locomotive. The Electric Traction Company stipulates that, should the experiment prove an advantageous and economical method of working, they are to have the option of entering into an agreement for working the railway by electricity for a term of five years, at a rate per train mile to be agreed upon, such rate not to be in excess of the cost of working by means of steam locomotives. When we consider the present advanced state of electrical science, it hardly appears too much to hope that the approaching trial may be successful. With electric engines, with stations and carriages brilliantly lit by electricity, and with the consequent freedom from smoke and dirt, the line, from its great immunity from summer heat and winter cold, will probably greatly increase in public favour.—*Investors' Guardian*.

Death of Mr. James Spicer.—The death is announced, at Woodford, of Mr. James Spicer, the senior member of the well-known firm of paper makers, Messrs. James Spicer and Sons, Upper Thames-street; Manchester, and Birmingham. The deceased gentleman, who was over eighty years of age, has gradually succumbed to an attack of cancer in the throat. Mr. Spicer was a prominent Congregationalist. His loss will be deeply felt by that body, as well as by a large number of religious and benevolent institutions, to whose counsel he gave his active support, and to whose funds he largely contributed during a long life.

Frauds in the Export Trade of Tientsin.—The United States Consul at Tientsin reports that Chinese manufacturers of straw braid, shipped during the past season at Tientsin, have committed frauds, the result of which is that the large stocks of braid exported have become unsaleable in Western markets. The fraud consists in packing damp bundles with dry ones; in using sulphur for bleaching; and pernicious dyes for colouring. In addition, purchasers complain of short measure, irregular makes, inferior straw, and other petty frauds. Something similar has taken place in regard to shipments of Mongolian hides, camel-hair, wool, horse-hair, bristles, etc. The hides are found to be wormy, and the hair and wool loaded with sand to the extent of 33 per cent, Mr. Smithers suggests that, in future, merchants abroad should instruct their agents in Tientsin to be more careful in their purchases, and to reject any merchandise not entirely sound.

New Brewery Company.—Messrs. Henry Mitchell and Co., brewers, Cape Hill, Birmingham, have registered themselves as a joint-stock company (limited). The share capital of £450,000 is divided into £225,000 ordinary shares, and £225,000 preference shares. The whole of the capital has been privately subscribed by the vendors and their immediate friends. Power has been taken to issue mortgage debentures, a portion of which will probably be offered to the public at an early date.

The Scotch Coal Trade.—At a meeting held at Dunfermline last week, the Fife and Clackmannan miners resolved to stop work for two weeks, because of the refusal of their masters to withdraw the reduction of 10 per cent. in wages. This means the stoppage of work by 6,000 men.

A New Liquor.—The *Indian Agriculturist* calls attention to the fact that India abounds in bananas or plantains, and wonders that the fruit has never been employed in the distillation of a fermented liquor. The common prickly pear has been utilised for this purpose in Malaga, and with considerable advantage to the distillers; and it now appears that missionaries in the Congo region have discovered that a beverage made of bananas is a preventive of malarial fevers. A banana liquor company has recently been started in India for producing banana liquor in either an alcoholic or non-alcoholic form, and which can be used with equal advantage as an ordinary liquor, or diluted with hot or cold water.

Cost of a Fog.—Sir E. W. Watkin has given figures showing the cost of a fog to a railway company. During five days "fogging"—or the extra staff and extra pay—cost the Manchester, Sheffield, and Lincolnshire Railway £878. There were 360 gross of fog signals consumed, at a cost of £180. Oil and paraffin cost £23 more; gas £25 more; and, with sundry other items, the five days' fog cost for additional wages and additional gas, stores, etc., £1,156. Thus fogs punish the railways, and benefit the producers of light and heat, illustrating the proverb that "one man's loss is another's gain.

Restriction of the Out-put.—The Miners' Union says that the supply of coal is too great. Hence the proposal to restrict the out-put. But if there be too much cheap coal in the market, how comes it that there are so many poor folk shivering in their houses these cold winter nights? The question is pre-eminently one for the Socialists.

Death of Mr. John Bell, of Middlesbrough.—Mr. John Bell, of Rushpool Hall, Saltburn-by-the-Sea, brother of Sir Lowthian Bell, and one of the firm of Bell Brothers, ironmasters and colliery owners, of Middlesbrough, has died suddenly of heart disease, at Algiers. The deceased gentleman was 68 years of age, and leaves a widow and family. He took a great interest in the mining and saltmaking operations of the firm.

The Fog and Shipping.—An illustration of the pecuniary effects of the fog on shipping is afforded by the fact that the large American liners, the *Montana*, with a cargo of more than 3,000 tons of tinplates, etc., and the *Wells City*, were, after leaving Swansea a week ago for America, detained off the Mumbles till Sunday.

What is it?—M. Guillot, a chemist at Angers, claims to have discovered a liquid which renders wood, muslin, paper, etc., uninflammable. Articles soaked in the composition if exposed to a great heat, emit black smoke, and are consumed, but never blaze. The process is at present kept secret, and may turn out to be one of those already known.

House Warming.—At the last meeting of the Literary and Philosophical Society of Glasgow, held on January 25th, Mr. Alfred E. Fletcher, H.M. Chief Inspector under the Alkali Works Regulation Act, read a paper on "Noxious Vapours and Town Smoke, with suggestions on House Warming." At the outset Mr. Fletcher proposed the question—"Can all noxious vapours be prevented?" He thought not. On the subject of smoke preventing appliances, Mr. Fletcher said the various systems proposed for economical firing with avoidance of smoke should be worked in competition. A proposal had lately been made that at the forthcoming International Exhibition such a competition might be carried out. A battery of nine or ten large boilers was to be employed in raising steam to drive the machinery of the Exhibition. If each of these were fitted with a mechanical stoker, a hollow bridge, a steam blast, or with any one of the many appliances now brought forward, an accurate comparison could be made of their relative efficiency, both as smoke preventers and as steam raisers. Such a competition would form a very marked feature of the Exhibition. Unfortunately, this useful project was not to be carried out. The scheme had been discussed by those having the conduct of the Exhibition, and dismissed as impracticable. He could not but think the committee magnified the difficulties, and somewhat lost sight of the many advantages that would have been obtained. Mr. Fletcher, speaking afterwards on the latter subject of his paper, explained the manner in which he had his own house warmed. On the back or garden side of his house, and about 14 feet from the ground, he had cut a hole for the admission of a light iron pipe 10 inches in diameter. This turned upwards a little, and was protected from falling dust by a slight hood. The air passing inwards met first a large sheet of thin woollen cloth, through which it filtered, and then deposited the smuts and dust too frequently found in the air of towns. From the shallow box containing the filter cloth the air passed on, as before, through a pipe to the heating stove, where it was warmed to a temperature of about 150° Fahrenheit. It afterwards ascended through a short pipe to a grating in the hall. This became filled with warm air, and from it the adjoining rooms drew their supply. The warm air ascended by the staircase, and found its way into every compartment. The ventilation not only went on as usual, but was much assisted by the constant stream of warm filtered air ever driven in. In the course of the discussion which followed general regret was expressed at the decision of the Exhibition Committee in refusing to allow trials of smoke consuming apparatus, one speaker suggesting that the committee should be again approached on the subject, but it was intimated that it was now too late.

Smelting and Welding by Electricity.—It has been pointed out in connection with the Institution of Electrical Engineers, now in session, that a great advance has lately been made in the application of powerful electric currents to smelting and to welding. Electricity is the agent in Cowles's method for producing aluminium.

Andersonian Chemical Society.—At a meeting of this society held on Friday evening, the 20th ult., a paper on "Dyeing and Calico Printing," by Mr. John Macadam, jun., chemist to the Lennox Mills, was communicated by the secretary. The paper treated shortly of the history of dyeing and calico printing, and afterwards dealt with the various processes of bleaching. The engraving of the cylinders was then taken up, and the printing, steaming, designing, dyeing, finishing, etc., of the goods explained in detail. The paper was an interesting one, and was well received by the audience.

With our Compliments, Mr. Lord.—This is what a Birmingham correspondent writes to his *Daily Post*:—"Sir,—I am very pleased that Mr. Cresswell's appointment has been confirmed, and that he will now be responsible for the weekly statements as to the illuminating power of the gas. I write to impress upon the committee the necessity of giving Mr. Cresswell the best and most reliable apparatus money can buy. Antiquated apparatus is of no use whatever, and I am not sure that the apparatus which has been used up till lately is of the first quality, or at all modern in construction. Give him good apparatus; and, secondly, I would strongly advocate the making of three or four extra testing stations. Have one as nearly as possible one mile away from the works, another at two or three miles away from the works; testings to be made on any day, not fixed times, between the usual hours, and such testings to be published. This well done would be of considerable benefit to users of gas. Gas-testing at the works is always open to suspicion. I have no intention of insinuating that any possible collusion could take place between any employé of the Gas Department and the gas tester; but I have been told of some gas-makers using an extra quantity of cannel just before testing day comes round. I have not the least doubt that in our departments nothing of this kind could take place; but, although the Act of Parliament says that testing should be done at the works, still I am of opinion that tests made some distance from the works, and entirely independent of the Gas Department; in fact, without their knowing anything at all about it, would be more satisfactory to the public at large,—W. J. Lancaster."—[We hope the Salford Gas Committee will take the several hints herein contained.]

An Example to Englishmen.—At Vienna a scythe manufacturer has been sentenced to five years' penal servitude for having manufactured goods of inferior quality and sold them in Russia under the trade-marks used by some of his best known fellow scythe makers.

Belgium and the Sugar Bounties.—The Government of Belgium, it appears, is not opposed to the adoption of the principle of an abolition of the sugar bounties. It only demands that adequate guarantees should be supplied against the covert enjoyment of bounties by means of frauds on the revenue, which frauds, it believes, are practicable, unless the system of manufacturing and refining in bond can be perfected, additional precautions being adopted. There are reasons to believe that if the required guarantees can be found, Belgium will be ready to adopt a system absolutely destroying the possibility of granting any bounty on sugar. This is very important, as Belgium exports four-fifths of the sugar which she produces.

Poisonous Gas.—Baron Larrey has addressed the French Academy of Sciences on the increasing number of people poisoned by inhaling carbon monoxide, commonly called carbonic oxide gas. He condemned the widespread use of stoves without chimneys. Recent investigations have proved that this gas is a chief agent of death in the case of those who perish in burning theatres and other buildings. Everybody who has sat round a large coal fire on a winter's evening has seen the lambent blue flame of carbonic oxide burning on the top of it. But not everybody is aware of the deadliness of the substance. So deadly is it that a rabbit, when placed in the gas, instantly drops down lifeless.

More Gold in Wales.—Another valuable discovery of gold is reported from Arthog, twelve miles from the present scene of Mr. Pritchard Morgan's operations. Arthog is situated on the opposite side of the Mawddach Valley, and is near to Clogan, where the discovery of £60,000 worth of gold was made some years ago.

The Salt Districts of Cheshire.—The loss to land and property owners in the salt districts of Cheshire is enormous, and only recently the chairman of the Salt Chamber of Commerce said that Northwich, or a very large slice of it, was doomed. Last week at Winsford Local Board a communication was read from the Northwich Local Board, suggesting that the two towns which suffered so heavily from subsidences following the extraction of brine should go to Government for a Royal Commission to consider the whole question. One member said that at Winsford they were in a different position to the Northwich folks. At Winsford the subsidences were gradual, while at Northwich they were sudden. In reply to a question the law clerk said the expense of the proposed Commission would be borne by Government. Ultimately it was decided to consult the salt proprietors with a view of obtaining compensation for losses, the chairman being of opinion that it would be inadvisable to fight the salt trade proprietors if they could obtain their object in an amicable way.

Patent Fuel.—During the past week Cardiff has exported 4,820 tons of patent fuel, as against 4,712 tons for the corresponding week last year. During the same period Swansea sent away 5,871 tons, against 5,770 for the corresponding week in 1887. This is equal to nearly one thousand tons per week of coal-tar pitch consumed.

Mining Institute of Scotland.—A meeting of this institute was held last week at Hamilton. Mr. J. S. Dixon, president, occupied the chair. Mr. F. J. Rowan read a paper demonstrating the scientific principles on which coal washing machines did their work, and a short discussion followed. The president, in view of the restrictions placed on blasting in mines by the new Mines Act, suggested the appointment of a committee to inquire into the various "flameless explosives" that were being introduced into the market, and a council was appointed for the purpose.

Copper.—Two firms at Swansea are each depositing from 40 to 50 tons of copper per week by electric currents of from 5,000 to 10,000 ampères. This is the result of the great development of late of the use of powerful dynamos for the deposition of the pure metal from impure copper ores. It is also reported that Messrs. Bolton, of Widnes, are contemplating depositing copper by means of dynamos.

The Whale Fishery.—It is reported that 1,311 whales have been killed within two years at the fisheries of Spitzbergen by the whalers of England, Russia, and Norway. A generation has passed away since there was a like record. In the good times of whale fishing, and while yet petroleum and the vegetable oils were not in general use, the total number of whales killed in the northern fisheries, from 1815 to 1858, was about 24,000, besides about 20 or 30 captured every year on the shores of the colonies. That was when Hull led the world's whaling.

The Welsh Gold Mines.—Ten heads of stamps for crushing the gold have now been erected at the Mount Morgan Gold Mine, Dolgelly, North Wales, belonging to Mr. Pritchard Morgan, and operations have begun on the gold quartz. Among those present at the early experiments conducted by the machinery, were Sir Warrington Smyth, Chief Inspector of Crown Mines; Mr. George Culley, Commissioner of Her Majesty's Woods and Forests; Mr. Lowray, secretary of the Commissioners; Mr. Le Neve Foster, Government inspector of mines; and Mr. Pritchard Morgan. These gentlemen saw a quantity of ore being broken out of the mine. The general manager of the mine, in his official report, states that the result of his first experimental trial was on 625 lb. of ore, which produced 18 avoirdupois ounces of gold. This was cast into a bar and presented to Mr. Pritchard Morgan. The experiment showed the gold to yield 57 oz. avoirdupois to the ton of 2,000 lb. In another test the quantity of ore amounted to 1,354 lb., which produced two bars of gold equal to 45 oz., being at the rate of a little over 67 oz. of gold to the ton. These results are satisfactory so far as they go, but the quantities crushed at present are much too small to furnish a real test of the value of the mine.

Boiler Registry and Inspection.—On the evening of the 25th ult. a deputation from the colliery proprietors and mine owners of England, Scotland, and Wales waited on the President of the Board of Trade (who was accompanied by Mr. Thomas Gray), with reference to the Boiler Registry and Inspection Bill of 1887, which the Government intend to introduce into Parliament in the ensuing Session. Mr. Haskell Peace read a memorial from the Mining Association of Great Britain which set out their objections to the Bill of last year. They said that their industry was already under stringent legislative enactment as to steam boilers, and that therefore they were entitled to certain exemptions. Lord Stanley of Preston, in reply, said that those matters would have to be fought out before a committee of the House of Lords in the ensuing Session, and they hoped to have the valuable assistance of such associations as the deputation represented. He quite accepted their view that large users of boilers made regulations for safety, but still many accidents occurred through ignorance on the part of small users. The Government intended to create a council of 15 experts from the Civil Engineers and other similar bodies to determine what was necessary for the safety of the public. With reference to colliery boilers, he should be glad to have their views in writing. The deputation, having promised to communicate further with his Lordship, withdrew.

A Dangerous Panic.—A panic occurred on the night of Jan. 25th at the Temperance Hall, Bolton, but did not result in serious injury to anyone, though the excitement for the moment was great. The Rev. J. Wayman, of Blackpool, was delivering an illustrated lecture on Ireland. For this purpose he used oxy-hydrogen gas bags, one of which burst. Flames shot up towards the ceiling, and the audience made a dash for the doors. Several persons were crushed, but as the flames speedily went out order was restored.

Blacking Mill Burnt Down near Coatbridge.—Last week the Calder Mills at Breahead, near Coatbridge, now used as the Scottish Moulders' Blacking Company's manufactory, were completely destroyed by a fire which broke out in the upper flat. The building was three stories in height, there being machinery for grinding in the ground flat, grinding stones and blacking powder in the second, and a large stock of the latter material stored in bags in the top flat. The fire is supposed to have originated by some of the bags being overheated, which is a common occurrence, and, being of a highly combustible description, the flames spread rapidly, and soon had a hold on the premises. The loss to the company is estimated at over £450, including stock of blacking and machinery, and this sum is not covered by insurance.

Esparto.—The importation of esparto into the United Kingdom last year was a little more than in the preceding year; but more of it seems to have been sent to Scotch ports. The Tyne imports fell off by one-fourth, but as the stock was exhausted, it would appear the consumption did not locally change much. Hull lost two-thirds of its esparto trade, last year, so that the Tyne suffered in company.

Coal and Railways.—In a letter to Mr. Pickard, M.P., the secretary of the Yorkshire Coalowners' Association, states one or two facts of interest. He says that the prices paid by the railway companies for the coal they use under present contracts "are in nearly every case lower than the previous year." He adds, too, that the fall in the cost of railway carriage on coal in Yorkshire "went into the pockets of consumers," and that "any trade is bad indeed when railways are compelled to lower their tariff in order to preserve it." Remarks like these are not flattering to the coal owners of South Yorkshire.

Technical Education.—A meeting of the North-east Branch of the National Association for the Promotion of Technical Education was held recently in the Council Room of the Mining Institute at Newcastle. The main purpose of the meeting was to consider what steps should be taken to secure a Technical Education Bill adapted to the requirements of the district In the discussion which arose on the matter, there was considerable discrepancy of opinion. It was difficult to find any general basis of agreement on the subject. Indeed, it does not appear that the Government can get much assistance in framing their bill in this quarter.

## PHOSPHATE OF SODA IN VITREOUS PHOSPHORIC ACID.

BY ANTON BETENDORF.

BRESCIUS has found in the so-called purest phosphoric acid of commerce as much as 15·3 per cent. of soda. As one part by weight of common salt requires 1,348 parts of fuming hydrochloric acid (1·190 sp. gr. or 38° Tw.), the solution of such phosphoric acid in fuming hydrochloric acid results in the separation of common salt. Experiment has shown that the decomposition of soda pyrophosphate by fuming hydrochloric acid of 1·19 sp. gr. takes place at the ordinary temperature, while with weaker acids soda pyrophosphate remains in solution. According to the strength of the muriatic acid employed, we can obtain direct vitreous phosphoric acid from phosphate of soda, by means of heating and fusing in platinum vessels, quite equal to the article now offered in the market.—*Journal für Anal. Chem.* 1888., xxvii. 24.

## THE CULTIVATION OF TOBACCO IN GREAT BRITAIN.

A WELL-ATTENDED conference of British tobacco growers was held last week at the Salisbury Hotel, Salisbury Square, under the presidency of Sir Edward Birkbeck.

The chairman, in opening the proceedings, reminded his hearers that at a previous conference a committee had been appointed, consisting of Lord Walsingham, Messrs. Faunce De Laune, Wigan, and Kains-Jackson, as well as himself, and this commitee had drawn up a report. Since the last meeting a large number of letters had been received from various parts of the country fully approving the establishment of a British Tobacco Growers' Association, and the writers included Lord Walsingham, Lord Torrington, Mr. Mark Stewart, M.P., Mr. J. J. Colman, M.P., and Mr. Edmund Beck (the Prince of Wales's agent), while letters had also come from Scotland, Yorkshire, Dublin, Cornwall, Boston, and many other parts of the United Kingdom. One of the principal recommendations in the report of the committee was that an organisation should be formed. The objects of the Association were clearly set forth—namely, "To resuscitate and encourage the growing and manufacture of tobacco in England, Scotland, and Ireland, as a native agricultural and commercial industry." The main point for the conference to consider was whether or not it was desirable to promote such an Association as would carry these objects forward. There was also the question of approaching the Inland Revenue authorities in reference to some sort of assistance. It would be a question for the Association to consider whether they should approach the Chancellor of the Exchequer by way of deputation and ask him to consider whether a drawback might not be allowed to English-grown tobacco of so much per ton. In conclusion, Sir Edward said he feared they would still have to combat official dislike to any changes that might be suggested, but still he felt it was their duty to make application to the Government and to ask that some assistance should be granted in the direction he had indicated.

Mr. Hastings moved that an association of British tobacco growers should be formed.

Mr. Sharman seconded the motion, which was carried unanimously, and Sir Edward Birkbeck was then appointed chairman of the association.

Sir Edward Birkbeck, after thanking the conference, suggested that Lord Harris should be the first president of the association, and this was also carried unanimously.

The meeting proceeded to discuss detail business, as to the formation of a council, etc. Mr. Baduin (ex-president of the Dutch Agricultural Society), Herr Hoffmeyer (Germany), and M. H. Vilmorin (France), were appointed vice-presidents, and the following gentlemen were appointed to act on the council:—Lord Walsingham, Sir Edward Birkbeck, Mr. W. L. Wigan, Mr. Kains-Jackson, Mr. E. G. Beale, Mr. Mitchell Henry, Mr. M. J. Sutton, Mr. Veitch, Mr. Mark Stewart, M.P., Mr. C. H. Sharman, and Mr. Faunce De Laune.

In the report, which was adopted, it was asserted that tobacco cultivation in England, Scotland, and Ireland might be easily and successfully carried out, and furnish raw materials the preparation and manufacture of which would create a large and profitable British industry, and which in course of time would probably be taken up by tenant farmers in suitable districts.

## REVOLUTION IN IRON AND STEEL SHEET FLATTENING.

NOTHING less than a revolution in the flattening of sheet iron and steel, and other sheet metals, is suggested by a new invention which is just now being introduced into this country from America. It is a patent levelling machine, the invention of Mr. J. W. Britton, of the Britton Iron and Steel Company, Cleveland, Ohio, and is being laid down at certain of the galvanised sheet and best iron and steel thin sheet works in Wolverhampton. The machine has attracted the attention of Lord Armstrong, of the Elswick Engineering Works, who has conducted careful experiments with a view to establishing the utility of the machine, and has expressed great satisfaction at the result. The invention is intended to supersede the operation of the cold rolling of sheet metals, flattening rolls at galvanising, and other work where flat iron is required, or levelling sheets by hammering. Instead of producing sheet metal only approximately flat, as is now the best that is possible, the new machine produces a surface which the most accurate measurement demonstrates to be absolutely flat and level, and entirely free from waves and buckles. So great an advance is brought about in this connection that sheets, after being passed through the machine, will pack in less than half the space hitherto necessary. The machine will accommodate sheets of 10 wire gauge and upwards, and of any length up to 10½ feet long by 40 inch wide. It will perform its work either with single sheets or with packs before bundling, and a comparison of sheets treated by the new method with sheets treated by the methods hitherto adopted is very striking. The machine weighs 5 tons, and little steam power is required to drive, a 2 in. belt being sufficient. By means of an hydraulic ram a strain of 60 to 80 tons is put upon sheets to be heated, and the short places in the sheet are stretched equal to the long ones. One man can run from 6 to 8 tons of galvanised flat sheets through the machine per day. The above operation is the whole secret of success. Not only is there a saving in time, but the absolutely flat surface is a feat never before accomplished. Ten machines are already in operation in the United States, and last year nearly 20,000 tons of sheets were levelled in America alone. Specific galvanisers in London, Bristol, Wolverhampton, and elsewhere have just laid down the machine.

## Queries and Replies.

SODA CRYSTALS AND CAUSTIC SODA.—Yes, these are both being made from ammonia-soda in Austria, but not in this country as yet, though I have heard it is intended at no very distant date.—W.

CHLORATES.—The soda-salt is the best to use in printing as it is much more soluble in water than the potash chlorate. —CHEMIST.

WELDON MUD.—Oxide of manganese was publicly used many years ago by Mr. Hills, of Deptford, for taking sulphuretted hydrogen from coal-gas.—COAL-GAS.

NITRATE OF AMMONIA.—What is the greatest use for this salt—Refrigerating or Explosives?—MANUFACTURER.

ARSENIC IN OIL OF VITRIOL.—Can any of your readers tell me how much arsenic there is in ordinary oil of vitriol at 150° Tw.—A DYER.

IRON IN OIL OF VITRIOL.—I should also be obliged if any one could furnish me with the quantity of iron which exists in oil of vitriol at the same strength as in the foregoing query.—A DYER.

POTASH ALUM.—In reply to the query of your correspondent, "Calico Printer," which appeared in yours of the 28th Jan., we produce both potash and ammonia alum.—PETER SPENCE AND SONS,

In reply to your correspondent "Calico Printer," this article is not made in England, it is made abroad. I can supply it at £8 10s. per ton for 10-ton lots and upwards.—G. G. BLACKWELL.

A PAYING CONCERN.—The accounts of the Gas Light and Coke Company show a balance to the credit of net revenue account sufficient to enable the directors to recommend the payment of a dividend for the past half-year at the rate of 12½ per cent., carrying forward £230,293.

# Market Reports.

## THE LIVERPOOL MINERAL MARKET.

The market this week has somewhat improved, although, on the whole, there is no advance in prices. Manganese: There have been two or three small arrivals, but most having gone direct into consumption it has had no effect upon prices. Mangesite: More inquiry, but the supply is more than equal to the demand, and prices are therefore unchanged at 30s. to 35s. for raw lump. Bauxite (Irish Hill brand): There is considerably more doing, and prices are unaltered at 20s. for lump; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Prices remain unchanged at 80s. to 85s. for medium. Barytes (carbonate): Best quality, particularly still, continues scarce, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s. Sulphate unchanged; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-Stone: More inquiry; ground, £6 10s. to £7; specially selected lump. finest quality, £9 to £10 10s. Purple ore, 6s. Emery-stone unchanged, at £5 5s. to £5 15s. for lump; and smalls, £5. Fluor and felspar quiet. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet without change in prices. Tungsten metal at 2s. 6d. per lb. Tungsten alloy 2s. per lb. Chrome ore has still improved in demand, and prices are stronger. Antimony ore, £8 to £10 for fair quality. Antimony metal from £31 to £32 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady: sulphate (celestine) 18s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, 25, and £30; other qualities, £4 to £12 per ton. Ferromanganese: 80 % packed, £11 2s. 6d.; 70 % packed, £10; 60 % packed, £8 16s.; 50 % unpacked, £7 15s.; 40 % unpacked, £7 5s. Spiegel, 20 %, £4 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8 10s. Bitumen, finest picked £35; original prime, £18 to £23; and good, £8.

## THE LIVERPOOL COLOUR MARKET.

Colours are mostly unchanged. Ochres: Oxfordshire £10, £12, £14, and £16; Derbyshire 50s. to 55s. Welsh: Best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s. Irish, 45s. Devonshire, 40s. to 45s. French: J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead £17. Red lead £16. Oxide of Zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6 10s. Cobalt: Prepared Oxide, 8s; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 6os. Vermilionette, 10d. per lb.

## NEWCASTLE FREIGHT MARKET.

During the week much steam tonnage has been taken up, brokers continue to quote fairly good rates for Mediterranean—in fact very little change is noticeable except in the Italian ports, and on the whole the tone prospectively is buoyant, even after the more pressing orders are out of the way. The following freights, however, were the best index of the market:—Constantinople, 10s.; Port-Said, 10s. 6d.; Alexandria, 10s. 6d.; Piræus, 9s. 3d.; Trieste, 12s.; Licata, 11s. 6d.; Messina, 10s. 6d.; Civita Vechia, 10s. 6d.: Savona, 10s. to 10s. 3d.; Genoa, 9s. 9d. to 10s.; Nice, 9s. 6d.; Cette, 9s. 6d.; Tarragona, 10s. 6d.; Barcelona, 11s.; Malaga, coals 8s. 3d., coke 10s.; Terredel, March. 8s. 6d.; Huelva, 7s. 6d.; Seville, 9s.; Lisbon, 6s.; Oporto, 7s.; Passages, 5s. 6d.; Santander, 5s. 7d.; Bilbao, coke 5s. 6d.; La Rochelle, 5s.; Bordeaux, 5s.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

Sulphate of ammonia, as anticipated, has given way in quite a marked fashion, and the true Leith value to-day may be stated as £12. 10s. at the outside—certainly not more, and perhaps a little less. There seems every chance of a further fall. The demand has weakened, and business for the most part is for short-time delivery, but as reserve supplies are not very large values are likely to rally again at no very distant date. Once more are the Scotch Oil Companies menaced by a wages difficulty. Their miners got a rise at the beginning of the month according to agreement, and already they clamour for a further increase to the same amount, a demand which it will be serious for the masters to refuse, and very serious for them to grant. A personal negotiation is in progress between the Scotch and American producers of scale and other paraffin products with the object of permanently stiffening prices, and the prospect of an agreement resulting, coupled with the other matter above mentioned, exercises the market to some extent. As regards general chemicals the market continues quiet at about former quotations. Chief prices current are:—Soda crystals, 41s. net Tyne; alum, £5, less 2½ % Glasgow; borax, English refined, £31, boracic acid, £46 net Glasgow; soda ash, 48/52°, 1d., less 5 % Tyne; caustic soda, white, 76°, £8. 5s.; 70/72°, £7; 60/62°, £6. 13s.; and cream, 60/62°, £6, less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6. net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 21s. 6d., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7s. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 % and 6 % to Scotch and English respectively; nitrate of soda, 9s. 6d. to 9s. 9d.; chlorate of potash, 6½d., less 5 % any port; sulphate of ammonia, £12. 10s. f.o.b. Leith; paraffin scale, hard, 2½d.; soft, 2d.; paraffin wax, 120° semi-refined, 3d., and remelted, 2¾d.; paraffin spirit, 6d.; burning oil, 6½d. to 8d.; lubricating oil, 885°, £6. 10s. to £7; sulphate of copper, £21. Glasgow imports for week include 11,100 tons iron ore, 700 tons copper ore, 1,320 tons pyrites, and 973 barrels rosin. Greenock, 36,167 bags sugar.

## LIVERPOOL CHEMICAL MARKET.

Although a fair amount of business has been done this week, there is no alteration to report in prices. Soda ash is quiet. Caustic soda: 60 % white at £6 2s. 6d.; 60 % cream, £6; and 70 % white, £7 2s. 6d. Bicarbonate, £6 10s. Nitrate of soda: There is little improvement at 9s. to 9s. 6d. Soda crystals, £2 15s. Silicate of soda: Brown lump, £6 15s.; green lump, £5 7s. 6d.; 100° solution, £4 17s. 6d.; and 75° solution, £3 12s. 6d. Bleaching powder: £7 15s. to £8 for hardwood, and £7 10s. for softwood. Saltcake 23s. Bichromate of potash, 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6 7/16d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 26s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic £11. Lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6 15s.; flour, £9 5s.; best thirds, £4 10s. Sulphate of copper continues firm at £23 10s. to £24. Blanc fixe, £8 10s. Manganese: Sulphate, £20; borate, best English make, 6d. Hydrate of alumina, £24 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) scarcer at 45s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 32s.; grey, 31s. Refined borax, £24 to £26. Verdigris, 1s. per lb. Acetate of lime, £12 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Liquid ammonia ·880, 3¾d.; ditto ·700, 3½d. Montreal potashes, 24s. Chloride of zinc (solid) £18. Hyposulphite of soda, dry and white £5 15s. Pearl ash, 40s. to 42s. 6d.

## MISCELLANEOUS CHEMICAL MARKET.

With few exceptions trade in chemicals is quiet, and the records of the past month have doubtless been disappointing to many who looked for an improvement of trade with the advent of a New Year. The past week has brought about further advances in copper and tin. Spelter remains very firm, and zinc salts are dearer. Tin crystals are again slightly higher. Sulphate of copper still irregular, but with

a firmer tendency, at £22 to £23. Acetates are still neglected, but prices are firm. Tar products generally are weaker. Crude and refined carbolic acids can be obtained at slightly easier rates. Sulphate of ammonia has suffered further considerable decline. Other ammonia salts are unchanged. Muriate is rather more plentiful, but there are no changes in price. Alkali is rather more brisk in Lancashire, but prices undergo little or no variation. 58 % soda ash can now be obtained, delivered in almost every large manufacturing town of the United Kingdom, at 1d. per degree. Potash, carbonate and caustic, are moving off freely, at prices noted in list of current quotations. Bleaching powder in Lancashire and Tyne districts (f.o.b.) is £7 12s. 6d. to £7 15s. per ton.

## THE ALKALI MARKET.

Dulness prevails everywhere in the alkali trade. At Newcastle, soda crystals are down below £2, while bleaching powder varies from £7 7s. 6d. to £7 10s., according to brand. Caustic soda is being largely sold at £7 17s. 6d. for the highest strength. A new feature in ammonia-soda is the formation of the Weaver Hall Brine, Salt, and Chemical Co. Limited, which we referred to on page 13 of our last volume. Mr. R. Wyllie is the engineer, and Dr. Pick's company will now have to look to its laurels.

## THE TAR PRODUCTS MARKET.

Benzol drags itself wearily along, and time shows clearly enough that the prices are being kept talked up. There is really no business doing, and even crude naphtha is beginning to feel the reality of the existing state of things. Pitch is a little better, as many large stocks have been worked down, but both carbolic acid (crude) and anthracene are weaker to-day. There are several parcels of B anthracene moving about without finding buyers at current rates. Creosote is in good demand for the "lucigen" and other lights, and from 1¼d. to 1½d. naked at the works, is the price obtainable to-day. Solvent naphtha is firm and inquired for eagerly.

## THE SULPHATE OF AMMONIA MARKET.

The market is very quiet to-day, but little doing, though the tendency to lower prices does not seem so certain as it looked a week ago. Foreign buyers hold aloof, looking forward to lower values, but makers will have learnt by this time the effect of putting sulphate on the market when it is not wanted. To-day's prices may be taken as £12 10s. Hull, and £12 7s. 6d. Leith and Liverpool. Beckton price is £12 15s., but London outside makes has been only fetching £12 10s. to £12 12s. 6d.

# New Companies.

Arctic Fisheries Company Limited.—Capital, £2,500 in £1 shares.

The Discoveries Limited.—Capital, £20,000 in £10 shares.

Patent Hydraulic Freestone Company Limited.—Capital, £10,000 in £1 shares.

Skytmyr Copper Mines Limited.—Capital, £120,000 in £1 shares.

Vulcan Fire Brick Company Limited.—Capital, £10,000 in £1 shares

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

R. Candlish & Son, Seaham Harbour and Rotherhithe, bottle manufacturers and merchants.

R. Johnson & Co., Liverpool, oil clothing manufacturers.

J. T. and H. Bythway, Manchester, merchants and drysalters.

W. Edwards and J. Page, Willenhall, ironmasters, under the style of Monmer Lane Iron Co.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Eades, Alfred Benjamin, Bath, oil and colour merchant.

James, Louisa Jane (trading as Louisa Jane Roberts), Llanfairpwllgwyngyll, Anglesey, brewer.

#### Adjudications.

Eades, Alfred Benjamin, Bath, oil and colour merchant.

Haines, Job, & Tomlinson, Henry Kirby, Leicester, curriers and levant dressers.

James, Louisa Jane (trading as Louisa Jane Roberts), Llanfairpwllgwyngyll, Anglesey, brewer.

#### First Meetings and Public Examinations.

Eades, Alfred Benjamin, Bath, oil and colour merchant. Feb. 16, 1, Abbey-street, Bath. Feb. 25, Guildhall, Bath.

Nodder, John, Devonport, currier. Feb. 3, Royal Hotel, Bristol. Feb. 2, County Court, East Stonehouse.

Volk, Magnus, Brighton; electrical engineer. Feb. 3, Official Receiver's Office, Brighton. Feb. 23, Court House, Brighton.

Blackmore, William Henry, Bermondsey-street, Southwark, and Endwell-road, Brockley, tanner. Feb. 7, Bankruptcy Buildings, Portugal-street, Lincoln's Inn Fields. Feb. 22, 34, Lincoln's Inn Fields.

#### Notices of Dividends.

Lock, Anthony Easterby, Upper Richmond-road, Putney, London, oilman. First and final of 2s. 6½d. Feb. 2, 109, Victoria-street, Westminster.

Abbott, Henry (trading as the Glamorganshire Rubber Co.), Swansea, indiarubber merchant. 5s. composition. Feb. 2, Official Receiver's Office, Swansea.

Dawson, William Wellbury, Great Grimsby, oil and manure merchant. First dividend of 3s. 1d. Feb. 6, 43, Victoria-street, Great Grimsby.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Hot Air Stoves.** A. E. Fletcher. 889. Jan. 20.
**Sulphur, Cyanogen, and Ammonia.** Hartley Kenyon. 896. Jan. 20.
**Liquid Ink Eraser.** R. N. Hobart. 900. Jan. 20.
**Working Coal and Minerals.** W. T. Goolden and L. B. Atkinson. 904. Jan. 20.
**Gas Motor Engines.** J. Southall. 909. Jan 20.
**Production of the Alkaline Metals.** Baron de Overbeck. 920. Jan. 20.
**Foot and Mouth Disease Lotion.** G. Jeanes. 922. Jan. 20.
**Freezing Machines.** W. H. Tomson. 926. Jan. 20.
**Forcing or Drawing Liquids.** G. H. Fish. 929. Jan. 21.
**Bisulphide of Carbon Motive Power Apparatus.** M. Blumrich. 942. Jan. 21.
**Lamp for Mines and Tunnels.** O. Y. Rhodes, F. Mori, and S. S. Skipton. 944. Jan. 21.
**Fittings for Emptying Carboys.** J. Bullen. 948. Jan. 21.
**"Reliance Refrigerator."** W. H. Richards. 951. Jan. 21.
**New Rubber Compositions.**—(Complete Specification.) A. M. Wood. 967. Jan. 21.
**Internal Flued Steam Boiler.** C. J. Galloway and J. H. Beckwith. 973. Jan. 21.
**Electric Batteries.** W. Balch. 980. Jan. 21.
**Bleaching and Washing Fabrics.** A. Mc. Nab. 988. Jan. 23.
**Carburetting Air and Gas.** C. Herzog. 1018. Jan. 23.
**Rotary Galvanic Batteries.** A. Wunderlick. 1029. Jan. 23.
**Apparatus for Supplying and Mixing Liquids.** H. G. Armstrong and J. E. Waller. 1030. Jan. 23.
**Cleaning and Preservation of Boiler Furnaces.** J. Rankine and J. P. Hall. 1038. Jan. 24.
**Oleaginous Vapour Lamps.** George Rose. 1045. Jan. 24.
**Improvements in Absorption Towers.**—(Complete Specification.) H. P. Weidig and R. C. Remmey. 1082. Jan. 24.
**Anti-Fouling Composition.**—(Complete Specification.) J. O. Wallace and W. Ward. 1101. Jan. 24.
**Electrolytic Treatment of Sewage.** W. Webster. 1105. Jan. 24.
**Grinding and Pulverising Machinery.** R. Stone. 1106. Jan. 24.
**Oxygen Light-Giving Apparatus.** G. Prescott and J. Farrar. 1109. Jan. 25.
**Regulator for Gas Heating.** J. E. Carter. 1126. Jan. 25.
**Galvanic Batteries.** A. A. Fortin. 1128. Jan. 25.
**Regulator for Gas-Heating Apparatus.** J. E. Carter. 1129. Jan. 25.
**Gas Burners.** A. Kuhnt and R. Deissler. 1134. Jan. 25.
**Metallic Cement.** A. Clery. 1135. Jan. 25.
**Purifying Anthracene.** F. Lennard and S. P. Eastick. 1158. Jan. 25.
**Purifying Sewage.** A. J. Capron. 1161. Jan. 25.
**Pulverising Ores.** E. C. Griffin. 1162. Jan. 25.
**Superheating Steam.** T. Bell. 1168. January 25.
**Removing Tin from Tin Scrap.** C. K. Farquharson and R. R. Gubbins. 1174. Jan. 25.
**Disinfecting Sewer Gases.** J. Arnold. 1175. Jan. 25.
**Suspending Elements in Batteries.** E. E. Mandeville. 1177. Jan. 26.
**Small Anthracite Coal as Fuel.** J. T. Williams. 1195. Jan. 26.
**Utilisation of Power from Water in Motion.** 1196. Jan. 26.
**Reversible Chlorine Batteries.** E. Andreoli. 1210. Jan. 26.
**An Improved Agglutinant.** H. H. Lake. 1222. Jan. 26.
**Improved Composition for Dressing Wounds.** H. H. Lake. 1225. Jan. 26.
**Furnaces for Roasting Ores.** G. de Wolf. 1230. Jan. 26.
**Improved Artificial Fuel.** C. H. Gosling. 1232. Jan. 26.

# PRICES CURRENT.

[THURSDAY, Feb. 2, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 9 | 9 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 11 | 6 |
| Chromic 82 % ... ... ... ... ... per lb. | 0 | 0 | 6 |
| Fluoric ... ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 3 | 0 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 4½ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... ... ... per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, ( ,, 150°) ... ... ,, | 1 | 17 | 6 |
| ,, (Pyrites, 150°) ... ... ... ,, | 1 | 6 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 7 |
| Arsenic, white powdered... ... ... ... per ton | 10 | 12 | 6 |
| Alum (loose lump) ... ... ... ... ... ,, | 4 | 13 | 9 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, ·880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 48 | 15 | 0 |
| ,, ,, (pure) ... ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 12 | 6 |
| ,, ,, (grey), Hull ... ... ,, | 12 | 10 | 0 |
| Aniline Oil (pure) ... ... ... ... ... per lb. | 0 | 0 | 9¾ |
| Aniline Salt ,, ... ... ... ... ... ,, | 0 | 0 | 8¾ |
| Antimony ... ... ... ... ... ... ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... ... ... ... ... per ton | 7 | 15 | 0 |
| ,, Carbonate (native) ... ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 8 | 9 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 3 |
| Benzol, 90 % nominal ,, ...per gallon | 0 | 3 | 9 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 2 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 76 | 15 | 0 |
| ,, Sulphate ... ... ... ... ... ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 70 | 0 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 33 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 1 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 16 | 0 | 0 |
| ,, Litharge Flake, ex ship ... ... ,, | 16 | 0 | 0 |
| ,, Acetate (white) ... ... ... ... ,, | 28 | 0 | 0 |
| ,, ,, (brown) ... ... ... ... ,, | 21 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 0 | 0 |
| ,, Nitrate ... ... ... ... ... ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 9 | 17 | 6 |
| ,, (grey) ... ... ... ... ,, | 14 | 5 | 0 |

| | £ | s. | d. |
|---|---|---|---|
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | 3 |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ... ... ... ,, | 18 | 10 | 0 |
| ,, Borate ... ... ... ... per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 10 | 0 |
| Methylated Spirit, 60° o.p. ... ... ...per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 10½ |
| **Oils:—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 4 | 6 |
| Cotton-seed ... ... ... ... ... ... per ton | 22 | 0 | 0 |
| Linseed ... ... ... ... ... ... ... ,, | 20 | 0 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 | 7 |
| ,, American ... ... ... ... ,, | 0 | 0 | 7½ |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 4 |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 16 | 9 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 6 |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | 1 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 | |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 15 | |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | |
| ,, Permanganate ... ... ... ,, | 4 | 5 | |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | |
| ,, Sulphate, 90 % ... ... ... per ton | 9 | 15 | |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 5 | |
| Silver (metal) ... ... ... ... ... ... per oz. | 0 | 3 | |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 17 | |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 17 | |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 12 | |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 7 | |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | |
| ,, Acetate (ex ship) ... ... ... ,, | 20 | 10 | |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | |
| ,, Borate (Borax) ... ... ... ... per ton. | 30 | 10 | |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | |
| ,, Hydrate (77 % Caustic Soda)... per ton | 8 | 10 | |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 12 | |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 17 | |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 18 | |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 17 | |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 12 | |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 10 | |
| ,, Manganate, 30/33 ... ... ... ,, | 10 | 5 | |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | |
| ,, Nitrite, 98% ... ... ... ... per ton | 30 | 10 | |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 2 | |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 17 | |
| ,, Sulphide ... ... ... ... ... ,, | 8 | 15 | |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 7 | |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 | |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 14 | |
| ,, Cane ... ... ... ... ... ... ,, | 0 | 17 | |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | |
| ,, Barium ... ... ... ... ,, | 0 | 0 | |
| ,, Copper (pure) ... ... ,, | 0 | 1 | |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 5 | |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 5 | |
| Tallow ... ... ... ... ... ... ... ,, | 26 | 15 | |
| Tin (metal) ... ... ... ... ... ... ,, | 165 | 0 | |
| ,, Crystals ... ... ... ... ... per lb. | 0 | 0 | |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 20 | 5 | |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, February 11, 1888.**


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As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

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Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.

## THE INSTITUTE OF CHEMISTRY.

FOR some weeks now a discussion has been going on in these columns respecting the Institute of Chemistry. Incorporated under the Companies Act, nearly ten years ago, the Institute was formed for the purpose of raising and maintaining the status and dignity of the chemical profession by means which at the time were not fully explained, and which are still unknown and unrecognised by the majority of those chemists who are now Fellows of the Institute.

Those who remember the movement in the days of its first inception, will remember that it was not the intention of the promoters to admit into their body gentlemen employed in the direct superintendence of manufacturing laboratories, or those practising as analytical or consulting chemists to chemical or other works. In short, such chemists, however eminent in their special lines, would not have been entitled to ask for enrolment upon the register under the heading of persons "now practising as chemists."

It is true that under the original scheme such chemists would have been entitled to ask for admission as members, subject to the proposed regulations affecting persons who were not then practising as chemists, upon their giving satisfactory proof of their having been duly trained, or upon their passing such an examination as the Council might have then thought fit.

Time passes rapidly, and the past is not easily remembered; but it is well known that this scheme had to be remodelled, and the modified programme found favour with the majority of those chemists who were naturally interested in maintaining the dignity of the profession. From time to time Fellows were elected, either by examination or otherwise, and the Institute waxed strong in funds, and using these economically and judiciously a charter has been secured, which in time should become a most valuable privilege for those in actual practice as professional chemists, provided those in office who direct the fortunes of the Institute treat the subject in a free and open spirit, inspired by a broad view of the situation.

It cannot be doubted that at the present time there is a very widespread feeling of dissatisfaction amongst the Fellows of the Institute, especially amongst those residing at a distance from the metropolis, and we throw out the hint that the Council would do wisely in issuing a Commission to collect ideas and opinions, which would no doubt serve to show the alarming extent of the dissatisfaction, and would most probably give some information and suggestions as to how the Fellows may work more in harmony with each other in the future. At the present time the Institute is a case of the house divided against itself, though we see no reason why this should be so, provided the Council turned some degree of attention to the wants of the Fellows. Country Fellows who have been quietly paying their subscriptions to the Institute for the past ten years naturally ask what benefit they have been gaining by the outlay, and such of them who look more to the elevation of the profession than to their own individual gain, are loudly declaiming that they see no alteration from that state of things which existed before the formation of the Institute. These are questions the Council should consider, and if they do not consider them quickly, and in a manner very different to the way in which all former complaints have been treated, we fear it will go ill with the Institute.

Year by year the President's address has only provoked hostile criticism in many quarters, and has not tended in any way to heal the sore which previous utterances had opened. Many Fellows of the Institute, though they may not hold such exalted positions as some chemists have arrogated

themselves, will not agree to submit quietly to the premeditated exordiums of a presidential address pointed specially at them. This is not the way to promote the welfare of the Institute, even if it adds to its dignity.

What the Fellows wish is clearly shown by the letters which have already appeared in our columns, and there is not the slightest doubt that if this were granted there would be more unity of opinion in the future than there has been in the past.

One correspondent signing himself "Menenius" points to three things which might be done, and with two of these we heartily agree. The first relates to the certificate of competency. If we go into the office of a chartered accountant we see facing us in the waiting-room a framed and nicely executed certificate of membership, and a similar sight meets our gaze if we go into the office of a Fellow of the Institute of Patent Agents. Many Fellows of the Institute of Chemistry desire the same; Is there any reason why their wishes should be denied? Such a certificate would be of no intrinsic value in itself; but in very many instances indeed the absence of such a document would cause inquiries to be made regarding the status of many a practising chemist who is not a Fellow of the Institute and, perhaps, never will be.

The second point on which we agree with "Menenius" is regarding the publication of all lectures delivered to Fellows of the Institute in London, and the issuing of them to Fellows; the cost would be but small, and deserves very careful consideration.

Respecting the publication of an official dictionary of chemistry by the Institute, we would like to hear more of the details of such a scheme before we gave it our entire approval, but we think the Council will never inspire confidence amongst the Fellows unless it shows clearly what work there is for the Institute to do, and the means whereby such work is to be carried out.

As to raising the salaries of chemists by any action of the Institute, we prefer to remain silent: we hope to deal with this in a future article, but as the annual meeting of the Institute will soon be upon us, we think the Council should take the matter in hand of the widespread dissatisfaction, and after carefully diagnosing the disease, apply the remedy.

# Legal.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

MR. MOULTON'S ARGUMENT.—*continued.*

My Lord, I have had pointed out to me another portion of Mr. Pattinson's evidence relating to the ordinary Caucasian ore. He said he used 222 parts for 100 parts of alum cake; he used therefore 36 or 37 times as much. Now it is very valuable to compare that instance with another. If your Lordship looks at the page before it, you will see in that case there was 88 per cent. of peroxide of manganese and 12 per cent. of impurities which may have been the thing which worked. Now, if your Lordship goes to page 105 you will see that Mr. Watson Smith tries with some native ore, too. On page 106 he says that that contained only 64 per cent. of $MnO_2$. Then one would imagine that this has less $MnO_2$, if $MnO_2$ is the active agent; we shall find that he requires to use more. What he said was, "I treated the sulphate of alumina in solution containing a little iron; first of all, in six parts I found the amount was insufficient. By gradually increasing the quantity and giving time, and by considerable agitation, filtration, and so on, I succeeded in extracting all the iron from that alum solution. Q. "What quantity of peroxide of manganese did you use when you extracted the iron?—A. I daresay 20 per cent., I cannot say precisely, because I do not consider it a commercial process. Q. Never mind that. Tell me first what the quantity was?—A. About 20 per cent., I think, instead of 6 per cent." Here is a striking thing: A man tries with a very pure specimen of anhydrous—at all events, with 80 per cent. of anhydrous—and in order to extract all the iron, he has to use 295 per cent. That is Mr. Pattinson. Then Mr. Watson Smith tries with one very much less anhydrous—only 64 per cent., allowing 36 per cent. of other matters. He has a considerable amount of trouble, even with 64 per cent. present. Then he works at it, although he says quite uncommercially, and he does get the iron out with the use of about 20 per cent. Here is a question for your Lordship to decide, Aye or No: Is anhydrous peroxide of manganese a sufficient agent? You have 88 per cent. here, and you have to use 300 per cent. before you can get the iron out. You take another sample in which you have only 64 per cent., and you find you have only to use 28 per cent. of that, instead of 295 per cent., showing that the less anhydrous there is the more effective it is, and when you come to consider that when there is anhydrous at all you can get 6 per cent. to do it perfectly and with the greatest ease, I think the case as to whether anhydrous is the sufficient agent and whether it will really work, becomes, even on the evidence of the defendants themselves, a thing of startling improbability.

Now, my Lord, just one more remark with regard to the specification. Up to this time I have been dealing with the claim only, but there is another way of putting this objection, not basing it on the claim but basing it on sufficiency of specification. I can put it alternatively. I can say this, all these methods of working with $Mn\ O_2$ are in the claim; you have not in your specification shown how to use them, you have only shown how to use one particular form, namely, that which is, as he describes it, made similarly to the way in which Weldon mud is made. The only reference you have made to it is this: "We would have it understood that we do not confine ourselves to the above specified quantities, nor to the precise mode specified for the application of our invention, nor do we confine ourselves to the use of the aforesaid Weldon mud." They claim that their invention includes the use of these other things: they have not given us any information how to use them. Then I say they are in this dilemma; either they are to be used in the same way as Weldon mud is and in substantially the same proportions—because there must not be anything left to experiment. I say substantially the same proportions; I am not in the least on the question of whether it is a little bit more or a little bit less, but either they must be used in the same way or they have not described how they are to be used. I submit they have not only not described how they are to be used, but they have not even described how they are to be made; and if I were to put this into the hand of even a fairly skilled person and say, "I want you to carry out this with—I will take it, pure anhydrous peroxide—if I were to say, You take it and carry it out with that, all I can say is that on the evidence of the defendants themselves it would certainly fail.

Mr. Justice Kekewich: If I understand your argument correctly, you say that assuming (which probably you do not admit) that the complete specification does particularly describe and ascertain in what manner it is to be performed, because though it describes and ascertains how it is to be performed in part, it does not describe and ascertain the other part.

Mr. Moulton: Precisely, my Lord. That is exactly the argument. Now, my Lord, if ever there was a case in which Counsel is justified in suggesting that objections like these have merits, I submit the present case is one, for this reason: Judges have warned patentees that it is far wiser to state and claim simply what you have discovered, and trust to the good sense of a court or jury, as it used to be in the older cases, to see that nobody steals your invention by just avoiding the particular form in which it is used, rather than to try to make your claim wide so as to catch everything, before you know whether or not everything will do. Now for the admission of Mr. Francis Mudie Spence, who was associated with Mr. Peter Spence in drawing up this specification, we find that substantially all they discovered was that if they got it from permanganate, or if they got it from Weldon mud, it would do. They have described Weldon mud, but they deliberately say this is to cover by their claim things they had tried and things they had not tried, and they purposely made their net wide. If your Lordship should be of opinion that in doing so they have rendered their patent invalid, they have only themselves to thank. They might have told the public the only useful

Mr. Esilman. Everybody really agrees that the book proves that Mr. Esilman made the discovery. Mr. Esilman is not one of those who took out the patent, he made the discovery simply from information given by Mr. Peter Spence, and he ought to have been joined with Mr. Peter Spence, or else it ought to have been Mr. Esilman himself, Mr. Esilman being in my opinion the person who actually did make the discovery. Of course I should not suggest that it was perfectly right to put Mr. Peter Spence himself with Mr. Esilman in it.

Mr. Justice Kekewich: You do not dispute that?

Mr. Moulton: No, I should not say that Mr. Peter Spence and Mr. Esilman together are not the inventors.

Mr. Justice Kekewich: At the present moment we are dealing with Peter Spence and Sons, which is a short way of describing Mr. Francis Mudie Spence and Mr. David Spence. The name "Peter Spence and Sons" is a comprehensive way of describing Mr. Francis Mudie Spence and Mr. David Spence. That I suppose is a mere question of assignment.

Mr. Moulton: Yes, my Lord, that is a mere question of assignment. I do not raise any question of that kind: there would be no substance in it.

Now, my Lord, as to that portion of the case, I submit the evidence is quite conclusive. I say the onus is upon the patentees. The patentees have called all the evidence they can call; it is clear that there is no other evidence which they can call, and I say that that does not sustain the onus.

Now, my Lord, there is another question that arises, and that is with regard to the Weldon mud.

Mr. Justice Kekewich: Are there any authorities on that last point that you were going to call my attention to?

Mr. Moulton: Does your Lordship mean with regard to what I said about the real inventors?

Mr. Justice Kekewich: On that last point about the positions of Mr. Esilman and Mr. Peter Spence.

Mr. Moulton: I shall call your Lordship's attention to some, but I do not think they are generally cases between master and servant; the outcome of which cases, I think, may be fairly stated as follows, namely, that a master has a right to the services of a servant, even in carrying out experiments for his invention; but if it be really the invention of the servant, the master cannot patent it: I do not mean cannot patent it on account of the property in the patent—that is a totally different matter.

Mr. Justice Kekewich: I want to know whether there are any authorities, that is all.

Mr. Moulton: There are some my Lord. *Menter* v. *Williams* is one.

Mr. Justice Kekewich: I only wanted to know whether I might expect any to be cited.

Mr. Moulton: Yes there will be some; but what I rely upon is that that declaration is a declaration which they could not make. Of course Mr. Spence will understand when I say that it is a fraud upon the Crown that I am speaking technically. Of course I am not asserting that Mr. Spence is guilty of fraudulent conduct.

Mr. Justice Kekewich: If it is a matter of a decision at all approaching this case I should like to have the decision present to my mind.

Mr. Moulton: Yes, my Lord.

Now, with regard to Weldon mud, I shall deal with it more when I come to sum up my evidence, but it may be that my friend will try to say that this is a patent for the use of Weldon mud specifically. I cannot quite see how they can limit their patent to Weldon mud, but if they do make any attempt to do it, I shall point out to your Lordship, that the fair conclusion of evidence as regards the experiment in Weldon mud (although Mr. Esilman himself seems to think that it was prior to the patent), when you come to examine all the evidence, I will make it plain that the experiment must have been made subsequent to the patent.

Mr. Justice Kekewich: Has any answer been received from the L. & N. W. Ry. Co.?

Mr. Chadwyck Healey: No, my Lord, I am instructed not.

Mr. Moulton: Now, my Lord, I will very shortly refer to the evidence that I intend to call before your Lordship in support of our case. It will be chiefly directed to two things: first to the main broad issue that $Mn O_2$ if anhydrous will not work. I use that broadly. I mean that if you try to work the process described in the specification with anhydrous $Mn O_2$ you fail. Secondly, I say that this failure to work is a failure which arises from the fact that $Mn O_2$ must be in combination in order to be efficient, and that when you take $Mn O_2$ in combination, either as a manganite of hydrogen or a manganite and any other base, such as calcium or even manganese, then you find at once certain efficiency graduated up to complete efficiency; that these manganites, either of hydrogen or bases are found in Weldon mud and compose it; and that Kynaston's specification is a true description of the invention and puts it not only right from a scientific point of view, but puts it on a right basis practically. For the purposes of the last point I will call your Lordship's attention to page 4 of Kynaston's specification.

Mr. Chadwyck Healey: May I submit, my Lord, that there is hardly a question in this case for the purpose of identifying the infringement which it is said the defendants have committed.

Mr. Justice Kekewich: What I understand Mr. Moulton to say is this: You have not described the real operation correctly in your specification, and by the way of illustration to show that I will refer to another document which happens to be Kynaston's specification, in which it is correctly described. I think Mr. Moulton is entitled to go as far as that.

Mr. Chadwyck Healey: If your Lordship thinks so.

Mr. Justice Kekewich: I quite follow your objection, Mr. Healey, and subject to anything Mr. Moulton has to say, it is a sound one as an objection to bringing in Kynaston's specification, but Mr. Moulton might bring in any other document or book in which this is described. He does in a document which happens to be Kynaston's specification.

Mr. Moulton: Now, my Lord, I am going to one point further; I am going to point out that this is what we have done. If your Lordship gives any interpretation of their patent which would keep it alive so as to make it a different operation for that which is accurately described in Kynaston's, then it would be non-infringement:—"Having now described my invention and the best mode known to me of carrying it into effect I wish it to be understood that I have read Semper's specification as amended, No. 4440 of 1882, and do not claim any portion of the same as my invention, and, further, I make no claim for precipitating iron from aluminous solutions by means of any oxide of manganese, as I know of no oxide of manganese that is adaptable for this purpose, and it is only manganite of hydrogen (the hydrate of the peroxide of manganese), or, rather, manganite, that is effectually peroxide of manganese itself, having no appreciable effect, no matter how finely pulverised; but that what I claim as my invention under the Letters Patent is—First: The separation of iron from solution of phosphate of alumina, or other salts not having a decomposing action on the manganous acid of the manganite by means of precipitated manganite of hydrogen ('hydrate of peroxide of manganese') or other manganite such as described, whether in the form of Weldon mud (purified or not) or other artificial precipitate prepared previously, or formed at the time in the solution by means of a chemical or chemicals added thereto substantially, as herein described."

Mr. Justice Kekewich: I understand that Kynaston's description in his specification reduces Spence's to an absurdity, because, reading the first three lines of Spence by the light of Kynaston's it reads thus:—"Our invention consists of producing alum and other salts of alumina, with but a very minute proportion of iron and of coloured organic impurity by digesting their solutions" with a thing which does not exist. He says "I know of no oxide of manganese which can be used for the purpose."

Mr. Moulton: That is adaptable for the purpose.

Mr. Justice Kekewich: I mean which exists for this purpose.

Mr. Moulton: I mean to say it will not work. Kynaston puts it that it is not to include the manganite of hydrogen under the head of oxide of manganese. That is it.

Mr. Justice Kekewich: I quite understand. Nobody could say you do not go far enough, Mr. Moulton.

Mr. Moulton: "In the process of separating iron for solutions by means of a manganite, the recovery of manganite of hydrogen in a state for reuse by removing the iron with dilute sulphuric acid, which will dissolve the iron without decomposing the manganite of hydrogen simultaneously produced. Third, In the separation of iron from aluminous solution by means of a compound of manganese, the preliminary peroxidising of proto salts of iron in the solution by means of an oxidising agent, and also subsequent separation of any dissolved manganese by means of an oxidising agent." I do not think this method of peroxidising completely the Weldon mud comes into question in this case, excepting as a very strong argument in favour of correctness of chemical views which I have put before your

Lordship. I have put before your Lordship that peroxide must be in combination in order to enable it to act upon the iron. Supposing you are using ordinary Weldon mud, which, as is assented to by all sides is not completely oxidised—that is to say, that some of the manganese there is in the form of an intermediate oxide, or what we have called manganite of manganese—supposing you use that, the chemical explanation I put before your Lordship is that the Mn $O_2$ takes up the iron and lets go what it had before. If that which it had before was water, when it takes up the iron it simply lets the water go. Of course that makes no difference. If it is in the form of manganite of calcium it takes up the iron and lets the lime go, which makes no difference. But if it is in the form of manganite of manganese, when it takes the iron it lets the manganese go, and then we get the phenomenon that the manganese passes into solution. And if your Lordship remembers, in the experiments which were made by Mr. Esilman when he began to try Weldon mud, he found that there was a grave difference in the process, because the manganese had passed into solution. What he was using was a case in which Mn $O_2$ had got hold of the manganite of manganese, and when he drove out the manganese by means of the iron down went the iron, no doubt, but the liberated manganese was then in a form in which it would pass into a solution. What he had liberated was protoxide of manganese, which did not combine with the peroxide in the way I have been talking about. Your Lordship remembers that the manganites of manganese were Mn $O_2$, combined with the protoxide Mn O. When you put the iron there instead, the Mn O passes into solution. How did he get rid of it? He peroxidised it all. Then he turned everything into Mn $O_2$ in the hydrated form, or Mn $O_2$ holding a base-like form. He got rid of Mn $O_2$ holding Mn, because Mn $O_2$ holding Mn is what we call an intermediate oxide. He peroxidised it all up until he got rid of that. He had been able to stop the manganese from passing into solution by destroying these intermediate oxides or these manganites of manganese, which shows conclusively, I submit, the correctness of the chemical idea that it is a case of using the manganite of manganese for the purpose of purification, so that when the iron takes the place of the manganese it passes into solution. The difficulty he met with on the very first occasion and which he got rid of by peroxidising, and which it is admitted must be got rid of by peroxidising, I submit proves very strongly the correctness of our views.

Now, I want to point out to your Lordship the experiments I want to prove. I want to show your Lordship how, scientifically, they prove the correctness of our position, especially as to the anhydrous not working. It is very rarely that in a case like this your Lordship has to decide, as it were, on a scientific fact, because generally a patentee is bound to claim what he has discovered, and does not try to grasp it more by staking the fate of his patent on the correctness of a hypothesis. But Messrs. Spence have done so in this way; that they have claimed all possible forms of Mn $O_2$ without trying whether or not they would work. Therefore I say the fate of their patent depends upon whether or not it is scientifically true that Mn $O_2$ will work. Now, what experiments do I intend to put before your Lordship? I intend to show by competent witnesses that they tried the Mn $O_2$ made strictly anhydrous, or so anhydrous that there could be only a small percentage of any impurites. Therefore they have tried it under the most favourable circumstances, and it will not work. They have tried it not only by making it in one method, but by making it in many methods. There are recognised methods of making anhydrous peroxide. There are something like four or five put in such a book as Watts' Dictionary of Chemistry. I will show your Lordship that my witnesses have made these experiments in various forms, and they will not do. I will show that our witnesses have tried the well-known form, the cheapest form, the ordinary peroxide, and that will not do. Now, my Lord, that is the first type of experiment, which I submit, would by itself be sufficient. But, my Lord, I am going to push it further.

I shall show you that my witnesses have taken an anhydrous peroxide that will not do; they have heated it so as to drive off a portion of the oxygen and reduce it to the intermediate, which is of course, as we know, a manganite of manganese, and that this, after you have thus destroyed the Mn $O_2$ in it, to a great extent will work. I do not say that it will work as well as Weldon mud—I do not pretend that it will—but it will work, and work fairly, because you have destroyed the anhydrous Mn $O_2$, and put in its place one of those intermediate oxides.

Mr. Justice Kekewich: Mr. Moulton, I want to clear my mind of a little difficulty, which is partly your fault, partly the fault of others, and partly, perhaps, my fault. You have just this instant used the term "anhydrous Mn $O_2$." You told me in this useful paper which I have before me, to which you have practically referred, that Mn $O_2$ is anhydrous peroxide of manganese.

Mr. Moulton: "Anhydrous" is perfectly pleonastic when used with the term "Mn $O_2$."

Mr. Aston: In opening the case I said that the formula would represent all through peroxide of manganese.

Mr. Moulton: Yes, that is so.

Mr. Justice Kekewich: When you add peroxide of manganese you add it intentionally, I suppose?

Mr. Moulton: It is simply *ex abundanti cautela*. It is pleonastic. Mn $O_2$ is hydrated peroxide of manganese. I purposely use it, quite conscious that I have no business to do so, but simply lest there should be any mistake. I have used the word "anhydrous" because they have talked about hydrated peroxide. My position is that hydrated peroxide is as different from peroxide as——

Mr. Justice Kekdwich: I shall follow you now. It was only by introducing the word "anhydrous" before Mn $O_2$ when I had got it that Mn $O_2$ was anhydrous.

Mr. Moulton: Your Lordship is quite right in saying that it is my fault. I submit that the hydrated differs in a chemical point of view from the anhydrous, just in the same way as carburretted hydrogen differs from hydrogen. It is a compound of hydrogen and another body.

Now, my Lord, I have put down there only the one form of hydrated peroxide—that is Mn $O_2$ and $H_2$ O. There are hydrates which have less water than that. Perhaps one molecule of water to three or four of the others, and as you go on you find them worse and worse. But one of the witnesses for the defendants said they are very richly hydrated. In Weldon mud, therefore they have worked very efficiently indeed. The more hydrated they are the better they will work. Therefore, the results of the experiments are, first, that the anhydrous will not work, and, secondly, that if you take anhydrous, and heat it so as to drive off the oxygen and reduce it to $Mn_3 O_4$, which is the very well known and exceedingly definite body which is one of the manganites of manganese, you can get that to work, and, if you were to re-oxidise that completely up to Mn $O_2$, you would get it back to inefficiency.

Now, I will take another. I will prove to your Lordship that, if you take Weldon mud itself and try Weldon mud, and then completely oxidise that up to the point of Mn $O_2$, and dehydrate it at the same time, which you can do by means of nitric acid, nitric acid being about the very commonest form of an oxidising process—If you oxidise it up to Mn $O_2$, leaving it with every particle of manganese in the form of Mn $O_2$, but dehydrated in the way you will find, that it produces a body which will not work at all. Now, there is the Mn $O_2$ still richly present, because all the manganese is in that form. It is suggested that it is a question of physical conditions. Your Lordship should see the powders that are used. They are fine powders. Certainly, there is nothing in the specification to suggest that any further care is to be taken, but I can give your Lordship a case in which the form in which it is thrown down is a form yielding an exceedingly fine and beautiful powder. To my eyes they are all the same fine powders, but I daresay there are degrees of fineness which I am not a judge of.

Then, my Lord, when one comes to the other methods of making Mn $O_2$, and making the hydrate, and not the anhydrous, that is making not only the Mn $O_2$ but the Mn $O_2$ HO. Whatever makes the hydrate peroxide, there is no better way than that described by so many of the witnesses, where you use Weldon mud, which is so richly hydrated. I shall be obliged, in dealing with this, also to call before you evidence on this point of making anhydrous compounds by heating, and my witnesses will prove that if you choose the heating for that purpose, if you deal with the hydrated form, and attempt by heating to reduce it to the anhydrous form, as one of the witnesses, Dr. Hurter, very properly said, "I would not say that drove out all the water"; but my witnesses will say probably not only does it drive out all the water, but what it does certainly is to drive off a portion of the oxygen, and so to produce these very intermediate oxides, these manganites of manganese, which are shown and will be shown directly to work. Well, my Lord, I do not know, looking at it as a chemical problem, what further kind of

evidence you can bring to prove that a certain chemical body does not possess a certain chemical power. We will prove that in cases where it is abundantly present, as in the native peroxide, you get very inefficient, if any, action. The defendants have proved for me that in taking two distinct samples of that body, the one which had the least $MnO_2$ worked much the best, and that which was most rich in $MnO_2$ only worked in ridiculous proportions. They have also proved that, taking the same proportions of this body so rich in $MnO_2$, you find that it leaves 1,000 parts of iron not thrown down; whereas, if you use the hydrated, you only get four parts not thrown down. Then, again, take a body which has got $MnO_2$, and lessen the amount which it has got, and it worked better. My Lord, that is an exceedingly strong presumptive proof that you have not been reducing the active agent. I take a further step: I take an agent—one which works the best of all after Weldon mud, and which they think works because of the presence of $MnO_2$, and I will perfectly oxidise it, and in so doing I will take the water out of the $MnO_2$, and I will leave it in the anhydrated state. Then it is not efficient. I will take the method of adding it in as fine a condition as possible to the solution, because it is anhydrous equally inefficacious. If I can put these facts before you, I can say we have proved by a method of concomitant variations that it will not work. I do not suggest that $MnO_2$ is not an operative agent just like oxygen is an operative agent in bleaching; but that is a very different matter from saying that because it has not oxygen in it for the purpose of bleaching, that the oxygen acts in the particular form. It may be that it can only be done by oxygen at the moment it gives up holding the hydrogen and becomes nascent oxygen, which is the most powerful oxidiser in the world; and will catch hold of anything and oxidise anything which is present at that moment when it is reduced to the nascent form, even things which otherwise would stand a century in association with oxygen, which was in a pure state and was not in combination. We say it was absolutely essential that $MnO_2$ should be in combination to produce this effect.

We say Kynaston put it forward, and we used Kynaston's process. We say, "You have not put it forward because there is nothing in your specification stating that it ought to be hydrated. Either you must take it that in using the words, 'manganese combined with oxygen to form a peroxide,' that the words, 'combined with oxygen' are, as it were, put in pleonastically—if you wished to use the word oxide, but not if you wish to guard yourselves against peroxide, or you must take it to mean anhydrous only. If including anhydrous and hydrated, then one portion of yours will not work. You either have not sufficiently described how your invention will perform its work, or else you have claimed something which is a useless thing and will not work—which will not do what it ought to do. In either case your patent has failed."

I will now call Professor Dewar, my Lord.

*(To be continued.)*

## SOCIETY OF CHEMICAL INDUSTRY.

### STUDIES ON COAL DISTILLATION.

A PAPER on this subject was read last Monday before the members of the London section, by Mr. L. T. Wright. It was divided into three parts. 1. The influence of the distillation temperature on the quality of the tar. 2. Influence of the distillation temperature on the sulphur compounds other than sulphuretted hydrogen. 3. Influence of the distillation temperature on the yield of ammonia from coal. Under the first head Mr. Wright said the coal was distilled in charges of 2 cwt. at various temperature requiring five, six, seven, and eight hours to gasify the volatile constituents of the charge.

Five samples of tar were drawn off for examination and distilled in a small experimental tar still.

The various results were:—

| | | | | | |
|---|---|---|---|---|---|
| Gas, per ton of coal..... | 6,600 | 7,200 | 8,900 | 10,162 | 11,700 |
| Specific gravity of Tar... | 1·086 | 1·102 | 1·140 | 1·154 | 1·206 |
| Ammonia water ..... | 1·20 | 1·03 | 1·04 | 1·05 | 0.383 |
| Crude naphtha ..... | 9·17 | 9·05 | 3·73 | 3·45 | 0·995 |
| Light oil..... | 10·50 | 7·46 | 4·47 | 2·59 | 0·567 |
| Creosote ..... | 26·45 | 25·83 | 27·29 | 27·33 | 19·440 |
| Anthracene oil ..... | 20·32 | 15·57 | 18·13 | 13·77 | 12·280 |
| Pitch ..... | 28·89 | 36·80 | 41·80 | 47·67 | 64·080 |

The crude naphtha thus obtained was then distilled in the ordinary way in the laboratory, and the following results obtained:—

| Specific Gravity of Tar. | Weight percentage of Crude Naphtha. | Specific Gravity of Crude Naphtha C.15·5°. | Volatile at 100° | 120° | 140° | 170° |
|---|---|---|---|---|---|---|
| 1·086 | 9·17 | 0·909 | 7⅜ | 7⅓ | 30½ | 58¾ |
| 1·102 | 9·05 | 0.929 | 10¾ | 9 | 27⅔ | 53¼ |
| 1·140 | 3·73 | 0·925 | 21⅜ | 24 | 43½ | 65½ |
| 1·154 | 3·45 | 0·932 | 17½ | 18½ | 39½ | 59¾ |
| 1·206 | 0·995 | 0·915 | 29 | 41 | 61½ | 79½ |

The tar acids in the crude naphthas, light oils, and creosotes were by volume:—

| Specific Gravity of Tar. | Tar Acids:— Crude Naphtha. | Light Oil. | Creosote. |
|---|---|---|---|
| 1·086 | 13 | 34 | 35 |
| 1·102 | 9 | 34 | 29 |
| 1·140 | 8 | 29 | 28 |
| 1·154 | 9 | 31 | 27 |
| 1·206 | 6 | 22 | 20 |

The anthracene oils were tested for anthracene by the anthraquinone test.

PERCENTAGE OF PURE ANTHRACENE BY WEIGHT OF TAR.

| Specific Gravity of Tar. | Anthracene. per cent. |
|---|---|
| 1·086 | 0·215 |
| 1·102 | 0·267 |
| 1·140 | 0·370 |
| 1·154 | 0·277 |
| 1·206 | 0·232 |

The creosotes from the two last tars were almost solid with naphthalene. All the other tars yielded perfectly fluid creosotes.

The oils coming over at 100° from the naphthas are at their maximum in the 1·102 sp. gr. tar.

The naphthalene makes its appearance prominently in the 1·154 sp. gr. tar.

The anthracene is at its maximum in the 1·140 sp. gr. tar.

The diminution of the tar acids (phenolic bodies) and the middle oils with increase of temperature is very marked.

Experiments were also described showing the influence of distillation temperature on the sulphur compounds in the gas, other than sulphuretted hydrogen. The following table shows the results of those experiments:—

| Averages. | Coal yielding Cubic Feet per Ton. | Grains of Sulphur other than Sulphuretted Hydrogen per 100 Cubic Feet | Sulphur other than $H_2S$ per 100 parts by Weight of Coal |
|---|---|---|---|
| 1.—Eight experiments..... | 11,620 | 44·17 | ·033 |
| 2.—Two ,, ..... | 10,772 | 36·93 | ·025 |
| 3.—Eight ,, ..... | 9,431 | 26·75 | ·016 |
| 4.—Five ,, ..... | 8,370 | 19·16 | ·010 |
| 5.—Seven ,, ..... | 6,896 | 13·91 | ·006 |
| 6.—Five ,, ..... | 11,190 | 40·52 | ·029 |
| 7.—Six ,, ..... | 7,562 | 27·00 | ·013 |
| 8.—Six ,, ..... | 10,047 | 31·74 | ·020 |
| 9.—Ten ,, ..... | 9,852 | 24·00 | ·015 |
| 10.—Seven ,, ..... | 7,853 | 20·30 | ·010 |
| 11.—Six ,, ..... | 7,125 | 20·75 | ·009 |

Nos. 1—5 were obtained from a coal (A) obtained from the the borders of Yorkshire and Derbyshire, 6 and 7 from (B) Silkstone coal, and 8—11 cannel coal (C). The following table shows the composition of the coal dried at 100° C.:—

| | A. | B. | C. |
|---|---|---|---|
| Carbon ..... | 81·92 | 78·81 | 72·50 |
| Hydrogen ..... | 5·39 | 6·07 | 6·02 |
| Sulphur..... | 1·97 | 2-42 | 1·16 |
| Nitrogen ..... | 1·28 | 1·78 | 1·32 |
| Oxygen (*by diff.*) ..... | 6·88 | 7·81 | 11·92 |
| Ash..... | 2·56 | 3·11 | 7·08 |
| | 100·00 | 100·00 | 100·00 |

The following experiments were then cited to show the effect of distillation temperature on the yield of ammonia:—

| Coal yielding Cubic Feet per Ton. | Ammonia per Ton of Coal. | Percentages by Weight of Coal as Ammonia. |
|---|---|---|
| 11,620 | 7·411 | 0·331 |
| 10,162 | 7·894 | 0·352 |
| 9,431 | 7·504 | 0.335 |
| 7,512 | 6·391 | 0·285 |

On the whole, the paper was a very interesting one, and goes to prove much that was surmised before, and it is interesting to find the temperature claimed in Davis' carbonisation process to be thus proved the best for the process, viz., a temperature at which rather less than 8,000 cubic feet of gas are produced from a ton of good gas-coal; and, moreover, that several points mentioned in the paper read at Birmingham in 1883 have now been experimentally corroborated. After the reading of the paper a short discussion ensued, in which the chairman (Mr. D. Howard), Dr. Armstrong, Dr. Tidy, Mr. Humphreys, Mr. Lacy, and Prof. Dewar took part; Dr. Tidy maintaining that more than 9,500 cubic feet of gas ought never to be made per ton of coal, and then there would be no difficulty of dealing with the sulphur compounds.

## AMATEUR CHEMISTRY.

THE *Gas World*, which has not attained any very great celebrity for accuracy even in gas matters, has now come forward as a critic in chemical matters. In its issue of Feb. 4th, the editor takes a writer in the *Daily News* to task for saying that "every three pounds of charcoal" yields eleven pounds of carbonic acid; and with a great flourish of trumpets says, authoritatively, "now, assuming that the charcoal was all pure carbon, and that it was duly saturated with oxygen, the weight of the combined gases in the form of $CO_2$ could not be more than eight pounds."

We do not know from what source the editor obtains his new chemistry, but the lines from Pope:—

> A little learning is a dangerous thing
> Drink deep or taste not the Pierian spring
> There shallow draughts intoxicate the brain,
> And drinking largely sobers us again.

very properly apply to this instance.

In case anyone may be misled by the statements of our learned contemporary, we beg to say that 12 parts of "pure carbon," produce 44 parts of "combined gases in the form of $CO_2$" and therefore three pounds must produce eleven pounds, if figures are worked in the same manner as they were when we went to school.

## THE POSITION AND PROSPECTS OF ELECTRIC LIGHTING.

BY W. LANT CARPENTER, B.A.

THE following abstract of a paper on the position and prospects of Electric Lighting in the metropolis will no doubt prove conclusively that the science and practice of electricity is making wonderful advances, not only for the extraction of metals, but also for purposes of illumination.

Mr. Carpenter began by a brief comparison of the means of producing, storing, distributing, and consuming gas and electricity for lighting purposes. In reference to the use of primary batteries being limited by cost, he spoke specially of the Upward batteries, and sketched the development of the dynamo from Faraday's discovery, the main point in connection therewith being the following figures:—

COMPARISON OF A 1,200 LIGHT DYNAMO IN 1882 AND 1887.

| | 1882. | 1887. |
|---|---|---|
| Weight | 44,820lb. | 11,760lb. |
| Bulk | 320 cub. ft. | 180 cub. ft. |
| Absorbed H. P. | 154 H.P. | 112 H.P. |
| Commercial Efficiency | 67 per cent. | 93 per cent. |
| Price per 1000 Watts output | £29 | £6 |
| Price per lamp | £2 | 7s. |

In nothing, he said, was the progress in five years so remarkable, and one could not reasonably expect much greater commercial efficiency. Pointing out the difference between direct and alternating current machines, the lecturer said the principal examples of alternating currents were at the Grosvenor Gallery and Paddington Station, and the disadvantage of them was that they could not use secondary batteries, without which he did not consider that any installation of electric light was complete. He briefly traced the history of storage batteries and spoke of the E. P. S. cells and the Union cells. He pointed out that a low tension current required large and costly conductors, while a very small wire sufficed to carry a high-tension current. The use of transformers was then described and illustrated: by the use of these instruments high-tension currents brought from a central station by small wires were transformed down to low-tension currents at their entrance into houses, and thus risk was avoided. He then went into the question of overhead and underground conductors and the distance limits of the distribution of electricity, which could be set down practically as not exceeding two miles for commercial working, and probably nearer one. In reference to arc lamps, these had improved very much in steadiness, but the Brockie-pell was, perhaps, the best, being practically perfectly steady. As to glow lamps, their construction was briefly explained, and attention was called to their improved light and the greater number of hours they lasted. With reference to London lighting by arc lights, probably most had been done by the Brush Company, who thought that as to semi-public lighting of a permanent character there was no better instance than Charing Cross Railway Station, which had been lighted from their works on the opposite side of the river for the last six years; also Liverpool Street and Waterloo Stations, and the South Kensington Museum, in which last place, according to the official reports, the cost of gas each year would have been more than double. In the Colonial Exhibition the Company had 160 arc lamps, 18 in the garden, and 16 for the fountains. Negotiations were going on between that Company and the Corporation for the lighting of a very large area in the City of London. The Thomson-Houston system was rapidly gaining ground, and was worked by Messrs. Laing, Wharton, and Down. At the American Exhibition they had 285 two thousand candle-power lamps, and there was not a hitch the whole time of the Exhibition. Longer established and nearly as large was the Gülcher Company, which had had 125 two thousand candle lamps at the Crystal Palace for nearly four years, and they now had 40 arc and 200 incandescents at the Aquarium, and 68 arc at the Olympia. The Gülcher Company made a speciality of supplying photographers with electric light for their work. For alternating current arc and glow lighting, Paddington Station installation, visited in October by the Society, and the Grosvenor Gallery, were almost the only examples. In incandescence lighting, driven without accumulators, they had the Brush Company supplying the Grand, the First Avenue, and the Métropole Hotels, and many thousand lights in different parts of London. The Maxim-Weston Company were putting down in the North of London a large installation of 50 arc lamps and 400 incandescents, which when complete would be the largest, or one of the largest, private installations in the suburbs. They were negotiating about a central station in the city, and the manager of their works said:—"I can assure you that the electric lighting industry, in my opinion, never looked brighter than it does at the present moment. If the prospects improve in the same ratio as they have done in the last four months, there will be a very wide field next year." Messrs. Woodhouse and Rawson had lighted many printers' and large shops, such as Shoolbred's. A typical instance of domestic lighting, by Messrs. Woodhouse and Rawson, was the house of a well-known surgeon, who had 40 lamps specially arranged for lighting pictures as well as for making examinations of the eye with the opthalmascope, and the cost of gas for driving the engine for one year was £12. The same firm had carried out a curious installation in the sewage tanks at Crossness pumping station, which had to be cleaned out every twelve hours, and in which the atmosphere was so bad that candles burned with difficulty. Referring to the lighting of theatres, the lecturer thought it essential that in any theatre the light should be put in two circuits entirely distinct, so that if anything went wrong in one, the place would not be in darkness, and so a panic would be avoided. A large installation of 5,000 lamps was being put in a large building in Whitehall, and a new system of distribution was being tried there by Mr. J. E. H. Gordon. As to installations in which accumulators formed a necessary part of the system, in the city the E. P. S. Company had more than 3,500 lights, and the use of accumulators was indispensable, since gas engines were nearly always employed, and when they were employed the light direct from the machinery was irregular. Among the prominent installations of this company were mentioned the Royal Society, the Bank of England, Lloyd's, offices of the P. and O. Company, and six banks. The largest thing Messrs. Drake and Gorham had done was the Prudential Insurance Company, with 2,500 lights, and when complete there would be 500 horse-power available, and 528 accumulator cells all in and for one building. After three years' trial the Bank of England was extending the lighting to all its principal offices.

The latest development was at the central station at Kensington Court, established by Messrs. Crompton and Co. It was the first station in London under the Electric Lighting Act, and it was extremely satisfactory in its financial results, the shares being now at 50 per cent. premium; and the company had decided to apply for powers to extend it over a very large area, comprising nearly the whole of Kensington, Knightsbridge, Brompton, and a portion of Chelsea, probably altogether the richest portion of residential London. The great feature was the small size of the plant and the space occupied by it in proportion to the work done. There was a special kind and special arrangement of accumulators, owing to which at present the steam engine and dynamo were never run after midnight. The engine employed was Willans' triple expansion engine, probably the most economical known. The cylinders were approximately 6, 8, and 12 inches diameter. The engine drove the dynamo direct at 370 revolutions per minute, and taken off the coal bill it burned 3½lb. of coal per electrical horse-power per hour. The combined engine and dynamo stood on a space 9ft. by 4ft. 6in., and there were three of them, each of which gave a current of 250 ampères, There were two boilers, by Marshall, of Leeds, 15ft. long, 4ft. diameter, which burned 60lb. to 70lb. of coal per hour. At present there were 1,000 lights supplied and 500 more were contracted for, all in private houses, each with a meter, The farthest house at present lighted was 900 yards from the station, and Mr. Crompton believed that he could supply houses two miles off. At the Kensington Court station there was room enough to supply 20,000 lamps. The charge was 8d. per Board of Trade unit, which worked out to, if one wished to be exact, 0·28 of a penny, which was practically a farthing per lamp per hour. In conclusion, Mr. Carpenter said:—"Reviewing the whole of the evidence before us, it may fairly be said, that the electric lighting industry has reached a stage in which the prospects of its very speedy development are decidedly good. As knowledge concerning it is gradually diffused the public becomes familiarised with the conditions under which alone it can be successfully carried out. The experimental step has passed. The days when electric lighting firms were glad to put up a temporary, and in some cases a permanent installation, at much less than cost price for the sake of advertising themselves and the light are, let us hope, gone for ever. The cases of failure of the light now are exceedingly rare, and I say advisedly that there is no case of failure known in which the cause was not thoroughly understood, and where it might not have been prevented beforehand by the expenditure of a little more money on the plant, or on the salary of a more competent superintendent, or on both. The mischief done by self-styled electricians, often so-called merely from having fixed a few electric bells, is well-nigh insuperable. The fact, too, that a few years ago electricity was a name to conjure with on the Stock Exchange, and the means of enormous sums being lost with the gambling that went on there, shook public confidence to its foundation. I regret to say that even at the present day there are certain company promoters, connected more particularly with so-called new primary batteries, etc., against whom intending investors and others interested need to be put upon their guard. Only a few weeks ago a former pupil of mine told me he had been the means of preventing a sum of money, measured in tens of thousands of pounds, from being thrown away on one of these bubble schemes. The legitimate work is steadily increasing, and, not only in London, but all over the country, manufacturers are looking forward to a rapidly increasing business.

## THE SEAL AND WHALE FISHERIES

THE Dundee sealing and whaling fleet is this season about to suffer a further reduction, and not more than ten vessels are being prepared to prosecute these industries in place of the sixteen ships which were in commission seven years ago, but this reduction is owing to the loss of four of the fleet in 1886 to 1887. Of this year's fleet of ten vessels two are to make the double voyage to Newfoundland and Davis Straits, four are to fish at Greenland and Davis Straits, and four at Greenland only. Apparently the ventures made in whaling and sealing from Dundee have not of late proved so remunerative as was expected, in consequence of the supply of these leviathans of the deep having become very scarce, most probably from previous over-fishing.

The industry of whale fishing has been prosecuted in Britain since the beginning of the 16th century. Acts for its encouragement were passed by the Legislature, and bounties were paid by the Government to the adventurers, both on tonnage of ships and tons of oil and bone landed in British ports. After the accession of James VI. of Scotland to the throne of England many Acts were passed by Parliament to encourage the trade, the seamen engaged being exempt from impressment for naval service, and these, with the bounties, were continued down to and including the reign of George III. From 1733 to 1785 the bounties granted amounted to £1,064,000 for England, and upwards of £202,000 for Scotland, and the official value of the produce of the whale fisheries imported into England in the forty-one years from 1760 to 1800 was £2,144,387. At that time the principal objects of the pursuit of the North Sea fishing fleets was to procure oil for lighting purposes. On the produce from the whale fishing, rich and poor alike, depended for light, the former using the Argand lamp, with cotton wick, and the latter the primitive "iron cruisy," with its rashy wick and whale oil; while in the streets and lanes of towns and cities darkness was made visible by the dim, old-fashioned oil-lamp. At this period the British fleet engaged in the whale fishing was very considerable, and for many years the industry proved on the whole so remunerative that vessels were constantly being added to the fleet. Ships then sailed from London, Hull, and one or two other English ports, as also from Aberdeen, Banff, Bowness, Fraserburgh, and Kirkcaldy; but now the only ships fitted out for the oil fisheries sail from the harbours of Dundee and Peterhead. Hull, which was at one period the chief whale fishing port of the kingdom—its harbour at an early part of the century forming a rendezvous for over sixty ships—does not at present, we understand, fit out a single vessel. Curiously enough, the decadence of the whale fishing dates from about the time when lighting by means of gas was becoming general throughout the country, and by 1840 the Hull fleet had become reduced to two vessels, although the number was again augmented.

In connection with this question, the following questions and answers, taken from a pamphlet published by Mr. F. A. Winzler, the Gas Pioneer, in 1807, may not be uninteresting:—

Q. Will not your plan hurt our fisheries, oil and tallow trade, etc.?

A. No; they must increase by it, because from saving so many new products at home we increase our exportations; we can afford to undersell in every foreign market all we gain at home from worse than nothing, from miserable smoke. We can employ hundreds more vessels and thousands more seamen.

Q. What will become of our tallow chandlers, our oilmen, our wick, and snuffer makers, etc.?

A. They may all work for exportation, that is, either become exporters themselves or sell to merchants who export in general. Thousands of chests containing from 20 to 100 dozen of indifferent candles are sent from Russia all the world over. I trust England may command the foreign markets with superior candles at a cheaper rate.

Q. But the lamplighters and chimney-sweepers?

A. The former will light clearer lamps in a cleaner dress, and no longer annoy the street passengers with the smoke and dirt of train oil. As for the poor chimney-sweepers, I hope they will get a more Christianlike employment.

But to return to our subject.

On the introduction of the jute fibre into Dundee for manufacturing purposes it was found that when manipulated with whale oil it was rendered very soft and beautiful, and therefore capable of being made into many useful fabrics. Hence, the great importance of the seal and whale fisheries to Dundee, and the energy which has since been displayed by Dundee whale fishing companies, which have spared no expense in introducing all the appliances of steam power into new ships, built specially for the purpose of pushing their way through the fields and floes of ice in the Arctic regions.

The first introduction of the whale fishing industry into Dundee dates somewhere towards the end of the last century, and was carried on with varied success, when in 1814 there were eight vessels engaged in it, varying in size from 270 to 300 tons burden. The trade appears to have been carried on with profit, for by 1839 the fleet had been increased to ten vessels. For nineteen years afterwards the success was indifferent, and at the end of that period the whalers were reduced to four. In 1858, through the enterprise of Mr. William Clark, shipowner, the whaler *Tay*, a full-rigged ship

of 600 tons register, was converted into an auxiliary screw whaler, being the first time that a vessel under steam sailed from the port of Dundee for Davis Straits.

In 1859, following the example of Mr. Clark, other owners launched two similar steamers, the *Dundee* and the *Narwhal*, built expressly for the seal and whale fishing. At this time the Scottish sealing and whaling fleet was as follows:—Peterhead, 28; Fraserburgh, 6; Aberdeen, 5; Dundee, 6; Kirkcaldy, 3; Bowness, 1—a total of 49 vessels: and these were so fortunate as to capture over one hundred whales. In 1860 the number of vessels engaged in whaling and sealing was 55, all but four of the number sailing from Scottish ports. For the eleven years ending with 1859 the British whaling fleet captured over 1,000,000 seals and 1,253 whales, the weight of bone in the same period being over 800 tons.

The fluctuations in the produce of the fishings have been considerable, and the same remark applies with equal truth to the prices realised for seal and whale oils and whalebone. During the eleven years ending with 1859 whale oil ranged from £31 to £54, and seal oil from £28 to £52 per ton respectively. The quotations for whalebone have ranged from £215 to £550 per ton, but during recent years the cost of that commodity has risen very greatly, the price rising as high as £2,500; in 1886 it was £2,250, but last year it had fallen to from £1,200 to £1,250 per ton.

This year the quotations are:—Whale oil, £18 to £22; whalebone, £1,200 to £1,250; seal oil, from £16 to £20 per ton respectively. It will thus be seen that where the fluctuations are so considerable the difference on the total proceeds of a year's fishing either of seals or whales is often very extraordinary. During the period from 1869 to 1877, inclusive, the average number of Dundee vessels that prosecuted the seal fishing yearly was 11, and the average number that engaged in the whale fishing was 10.

The following tables for the past ten years show the catches at the seal and whale fishings respectively, the number of ships engaged, and the total value of the catches. The values in the seal fishing table include the price of skins, and those in the whale fishing table the price of whalebone:—

WHALE FISHING.

| Year. | No. of ships. | Tons oil. | Tons bone. | Total value. |
|---|---|---|---|---|
| 1878 | 13 | 112 | 6 | £10,080 |
| 1879 | 13 | 729 | 38½ | 76,377 |
| 1880 | 12 | 1084 | 56 | 86,352 |
| 1881 | 11 | 514 | 24¾ | 34,782 |
| 1882 | 11 | 676 | 25 | 54,028 |
| 1883 | 8 | 628 | 9½ | 38,605 |
| 1884 | 9 | 838 | 36 | 117,000 |
| 1885 | 11 | 368 | 11 | 25,164 |
| 1886 | 11 | 387 | 12½ | 37,815 |
| 1887 | 9 | 316 | 7 | 19,594 |

NEWFOUNDLAND AND GREENLAND SEAL FISHING.

| Year. | No. of ships. | Seals caught. | Tons oil. | Total value. |
|---|---|---|---|---|
| 1878 | 13 | 84,161 | 1115 | £55,750 |
| 1879 | 15 | 96,710 | 1108 | 59,212 |
| 1880 | 13 | 74,763 | 1325 | 52,834 |
| 1881 | 15 | 152,706 | 1998 | 96,118 |
| 1882 | 12 | 68,400 | 987 | 49,290 |
| 1883 | 13 | 113,353 | 1460 | 73,598 |
| 1884 | 14 | 47,945 | 784 | 35,230 |
| 1885 | 13 | 127,315 | 1205 | 72,539 |
| 1886 | 9 | 43,490 | 685 | 27,323 |
| 1887 | 6 | 55,651 | 1100 | 36,310 |

# Correspondence.

**** We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE TIPPING SYSTEM.

*To the Editor of the Chemical Trade Journal.*

Sir,—Will you allow me to add my testimony to that already given by others against the "tipping system." Regarded simply as an unjust tax upon material used, the "tip" is bad enough, but its bearings upon trade generally are much more serious than may appear at first sight. At the present time, when keen foreign competition makes it an act of sheer insanity for the English manufacturer to lose a single point of possible advantage, it seems more than ever necessary to stamp out and utterly abolish what is virtually a protection, increasing with the inferiority of the goods protected, and a bar to the introduction of pure and genuine articles. For it will readily be seen that the seller of inferior stuff is able to bribe more heavily than he who offers better samples to his customers, and the very trafficking in spurious goods is apt to produce a degree of morality corresponding. I am inclined to blame the manufacturer largely for the prevalence of this odious system. In the first place he should not allow himself to be influenced by his *employés* unless they can give him satisfactory reasons for their choice and selection, and when I say "satisfactory reasons," I mean reasons the soundness of which he has proved by personal investigation. Too often there is a fatal remissness in this respect. Then again, the evil might be greatly reduced if personal contact were prevented between the seller and the particular *employé* who uses the article. Where this contact is freely allowed, and the traveller has open access to the works, the greatest facility is afforded for bribery and corruption. That form of the evil that consists in the traveller inviting the user to meet him at his hotel or elsewhere, is perhaps more difficult to grapple with, but even here a sharp outlook will probably soon lead to a reformation.—I am, etc.,

ANTI-HUMBUG.

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*To the Editor of the Chemical Trade Journal.*

Sir,—Referring to correspondence *re* Tipping System, the *discontinuance of this can only be accomplished by the action of the proprietors of works themselves.* Just previous to last Christmas we sent the following notice to those who supply us with goods, and have strictly carried out what is embodied therein:—"Please note that we do not allow any of our staff to ask for or accept a gratuity at this or any other time of the year. We will take care that your interests do not suffer by your compliance with our request in not giving a gratuity. Should it come to our knowledge that an application to you has been acceded to we should reluctantly close our account with you and discharge the applicant from our employ."

J. E. JOHNSON, F.C.S., etc.,
Messrs. Kindersley and Johnson,
Manufacturing chemists, Stratford, E.

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## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—I have given notice to bring forward at the first meeting of the new Council a scheme for altering the basis of entrance to the Institute.

According to the present regulation of the Council it is necessary that any candidate for the Associateship should have studied chemistry at one of twenty schools or colleges in the United Kingdom, so that anyone having received his chemical education—however thorough it might have been—in any other school, college, or private laboratory is ineligible, however willing he may be to pass the most stringent examination.

I shall be glad if any of the members of the Institute who sympathises with the idea of altering this regulation, and who have not previously communicated with me, will be good enough to give me their views as early as possible, so that I may have their moral support in bringing this matter before the Council.

I should also be glad to hear any other suggestions from any of your readers with a view of increasing the usefulness of the Institute.—I am, etc., WILLIAM THOMSON.

Royal Institution Laboratory, Manchester,
6th Feb., 1888.

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*To the Editor of the Chemical Trade Journal.*

Sir,—In my letter in the *Chemical Trade Journal* for Dec. 17 upon the above subject, I treated of six points to the following effect:—

(1) I complained that the I.C. had done nothing for its Fellows.

(2) That it did not try to give its Fellows any protection against the army of half-trained persons—non-Fellows—who because they *are* half-trained, are working for twenty-five shillings a week.

(3) That it would add to the "dignity and welfare" of the I.C., if it endeavoured to prevent these half-trained men from practising, and to "*so unite* the profession upon the subject of remuneration that the present ridiculously low salaries would be a thing of the past."

(4) That their present "Certificate of Competency" was not a certificate of competency, and was rather a mean and paltry document, and they ought to issue a better.

(5) That the lectures by Messrs. Warrington and O'Sullivan had never been printed in extenso and issued to all the Fellows, consequently (as was perhaps intended) these lectures were snugly kept in the hands of the London clique—sons of professors, etc. for whom they were a nice bit of cheap education.

(6) That the Institute would do a service to Chemical Science if it initiated an "Official Dictionary of Chemistry," on lines indicated in my letter.

Seven correspondents have been good enough to discuss the subject, and so far as I can see, the only points on which I am at issue with them are Nos. 2 and 3. I must say I am disappointed in one thing, points 4, 5, 6 have not been touched upon by any of your correspondents. I certainly should like to see an expression of opinion on what I cannot help thinking are three matters of great importance at the present time when *some action seems likely to result from this correspondence*. Fellows must not be half-hearted: there must be no "let-it-alone" policy. Fellows, and particularly provincial Fellows, must strike a blow for themselves; strike at once, and strike hard. The ballot box can do a great deal towards altering the present unsatisfactory state of things.

Like "A Disgusted Fellow," I certainly object to the admission at this time of day of persons as Fellows and Associates without examination. This won't add to the dignity and welfare of the Institute.

J. K. H. protests against the profession of chemistry being restricted to those who are members of a society that has so far shown itself "incapable of comprehending the interests which it was formed to protect." In other words, he objects to points 2 or 3, or both. J. K. H. admits he is not F.I.C. He has been considering if it is or is not worth having. He would, perhaps, alter his tone after he became a Fellow. He admits the Institute was formed to protect interests. May I ask him whose interests if not Fellows' interests? If the Institute carried out suggestion 3 it would show itself *capable* instead of *incapable*. Perhaps, with this modification, J.K.H. would agree with No. 3. I for my part certainly will agree with J. K. H. while it is incapable.

The letter of "Common Sense" is rather vague to my way of thinking. He writes like an employer, and perhaps that is the "other standpoint" he writes from. His allusion to "signs of the times" is rather unfortunate for him. He talks of "dictating to a manufacturer in his choice of a chemist." He is responsible for the expression, not I; but I respectfully submit that in a good many cases I have known the manufacturer has dictated to the chemist in his choice of a salary and other matters.

Signs of the Times! Are not corners, pools, and syndicates to keep up prices, signs of the times? and although many in the press and out of it, condemn them and say they will not last, they are like this ball of ours, they roll on—they are combinations to secure a greater remuneration. Why does the employer pay eighteen shillings a week for labour, because labourers are sufficiently united on the point, and he cannot get them for less. Why 7½d. per hour minimum to the bricksetter, the plumber, and so on, because there is sufficient unity to prevent cheaper rates. Signs of the times! Why, everybody is going in for more money. I have to pay one shilling now for having my chimney swept. I can remember having it done for fourpence, this is a sign of the times; things which used to be begged are now articles of sale. Certainly chemists have to do the same as others, pay more to live than they used to do, and they have a right to combine to obtain more salary. This looks like trades unionism I admit, but it is trades unity that has done so much to increase the incomes of others. Dr. Frankland in a letter to the *Chemical News*, December 18th, 1885, said of the Institute that its object certainly was not that of the modern trades unions. Its chief intentions were educational and ethical. So I suppose I was wrong in expecting anything of the kind from the Institute, but I have still a right to suggest that it could become so far a trades union as to endeavour "so to unite the profession, *i.e.* the competent men, upon the subject of remuneration that the present ridiculously low salaries would be a thing of the past, and if its intentions are educational and ethical, it should do something to prevent incompetent men, *i.e.* non-Fellows from practising; taking it as it is, together with Dr. Frankland's statement, Fellows can only look upon it as an association for taking care of the interests of those who employ the chemist rather than the interests of the chemist. "Common Sense" speaks of the right at present enjoyed by *everybody* to practise publicly as consulting or analytical chemist—just what I object to. I would allow only competent persons, not everybody, *i.e.* Tom, Dick, and Harry. "Bon Ami" shows that we are not united. I agree with him there. I want the Institute to promote unity, but for reasons already given I disagree with his concluding caution.

I am in harmony with the letter of "A Country Fellow." "A Highlander's" is a letter worthy of a Highlander. Like a good claymore it is bright, sharp, and swift. I thank him for his support. Out with the schoolmasters.

Perhaps "Another Country Fellow" will shew me where I said the Institute should "*Dictate to an employer.*" I certainly pointed out that owing to the action of the medical profession it is now impossible for unqualified medical practitioners to practise, and the unqualified ones being weeded out, the qualified men have a better chance and can command better terms; indeed the result has been "*so* to unite" the profession, that I am assured by a medical friend the *necessity* for charging very low fees is a thing of the past.

Certainly if I am in error in referring to law, medicine, and pharmacy to show that they are *protected* professions I will at once frankly admit it when it is proved, but "Another Country Fellow" has not proved it. Pray what fixes the 6/8 as a lawyer's fee? and on what principle are solicitors' costs taxed? There is evidently a recognised standard of some sort. "*Everybody*" cannot practise as a lawyer. Why? Law and medicine do it somehow. How do they do it?

In conclusion, if the Institute of Chemistry is simply to do nothing to improve the position of the poor chemist,—if it is to leave these things to be settled individually, and make no effort (not to dictate to employers but) to unite the profession on the subject of remuneration,—if it is to be an institution founded by chemists and supported by chemists hard-earned money, to make the public or those employing chemists certain that they get the service of a properly qualified man without securing to the chemist a *quid pro quo*, or even a quid of any kind, then I say the Institute is more for somebody else and less for the chemist,—then again I say: If the Institute will not do anything for us let it go to the dogs, and for Heaven's sake let us have a new body,—a trades union. Let us do what the working man, the butcher, the pharmacist, the lawyer, the doctor have done; let us unite as everybody else seems to be doing to get as good a return as possible for our labour.

I shall do my best to be present at the next Annual General Meeting, and shall overhaul the balance sheet and report. The next annual general meeting will, perhaps, be rather livelier than usual, there will be two parts carried to some of the tunes as Josh. Billings says.

I should advise Fellows when they are in London to just step in the office now and then, and see how they are going on. We get so little information in the country as to how things are going on, that we may be excused for calling in to see the secretary, we only "want to know y' know."

Apologising for the length of my letter.—I am, etc.,

Menenius.

# Trade Notes.

The Oil Trade Conference.—The result of the Oil Trade Conference has excited considerable interest in business circles, and general satisfaction was expressed that matters have reached their present stage. It is now admitted, even by those who may be regarded as confirmed pessimists, that the future of the trade presents features of encouragement that cannot be overlooked. In fact the improvements now being realised exceed the anticipations of a month or so ago, and they will go towards very materially reducing the losses incurred by the strike in the early months of the year. But that in all cases these losses will be made good no one who has followed the course of affairs can ever have anticipated. All the same, the indications at present are that some surprises of a pleasant nature are in store. The following figures show what certain gains in products on the prices of last year mean to the Scotch Oil Companies. The production of 1886, as certified by the Board of Trade, is taken as the basis. In that year the figures were—

| | |
|---|---|
| Burning oil and naphtha, about ... | 500,000 barrels. |
| Lubricating oil, about..... | 33,000 tons. |
| Paraffin scales, about ..... | 21,000 ,, |
| Sulphate of ammonia, about..... | 15,000 ,, |

Now ½d. per gallon on burning oil represents £41,666; ½d. per lb. on paraffin scale represents £49,000; each 10s. per

ton on lubricating oil £16,500, and each 10s. per ton on ammonia, £750. As lubricating oil is 50s. up on last year and ammonia 20s., it seems not unreasonable to take it that at least 10s. in each case will be retained throughout the ensuing season, and if wise counsels prevail, burning oil next season will be at least 1d. per gallon dearer than this, and scale will be selling at not less than 2½d. per lb.

THE SEWAGE OF PARIS.—The Chamber of Deputies, by 245 votes to 235, granted urgency for a bill authorising the utilisation of the sewage of Paris for fertilising purposes, with a view to the sanitation of the Seine. The House subsequently adopted, by 253 to 240 votes, two articles of M. Raspail's counter bill, providing for the construction of a covered canal, extending from Paris to the sea, with reservoirs, for the benefit of farmers who might require them. Ultimately, however, the whole of the counter bill was rejected, and the first clause of the Government bill for the utilisation of the sewage in the plain of Acheres, near St. Mermain, was adopted, in spite of the opposition of the Right, who declared that a sufficient number of members were not present.

CONFERENCE ON RIVERS POLLUTION.—Lord Egerton of Tatton presided at a conference, held at Manchester last week, and attended by some 200 gentlemen, representing 74 local authorities, to consider what steps should be taken to prevent the pollution of the rivers Irwell and Mersey. His lordship remarked that there was an imperative necessity laid upon them, both on the grounds of preserving the public health and in order to ensure the ship canal being carried out successfully, to devise means for purifying those streams. They did not expect to be able so far to cleanse them as to render the water fit for drinking purposes; but they could by proper measures ensure a moderately pure water. Something had already been done in the right direction, but not so much as might have been expected from the powers they possessed under the Rivers Pollution Act, through the inactivity of the different local bodies within whose jurisdiction the watersheds lay. Resolutions were subsequently passed affirming the necessity of steps being taken to prevent the pollution of the streams, and requesting the manufacturers and the general public to give their aid in attaining that object.

ALARMING LIME-LIGHT ACCIDENT.—An alarming incident took place last week, at a lecture delivered at Icknield Street Board Schools, by Councillor Lancaster, under the auspices of the Sunday Lecture Society. The subject was "From London to Rome," and was illustrated by lime-light views. Two bags of gas were placed in the room on Saturday evening in readiness for the lecture. Last Sunday, however, it was noticed that one of them had in some way become half emptied, and the lime-light operator had some difficulty in getting sufficient illumination of the views. Shortly before the close of the lecture one of the bags exploded with a startling report, splintering the compression board into fragments, and hurling the weights, amounting to about a quarter of a hundredweight, into one corner of the room.

THE DEATH RATE.—The Registrar-General reports that the annual rate of mortality last week in twenty-eight great towns of England and Wales averaged 23 per 1,000 of their aggregate population. The rate in Birkenhead was 21; Birmingham, 21; Blackburn, 28; Bolton, 24; Bradford, 19; Brighton, 17; Bristol, 18; Cardiff, 23; Derby, 20; Halifax, 24; Huddersfield, 20; Hull, 18; Leeds, 19; Leicester, 19; Liverpool, 21; London, 24; Manchester, 26; Newcastle, 21; Norwich, 20; Nottingham, 25; Oldham, 18; Plymouth, 25; Portsmouth, 28; Preston, 18; Salford, 21; Sheffield, 25; Sunderland, 20; Wolverhampton, 23. The rate in Edinburgh was 23; Glasgow, 23; and Dublin, 32.

THE DEATH RATE IN GREAT CITIES.—The *Bulletin Medical* gives the following as the death rate of thirty great cities, excluding London:—Brussels, 15 per 1,000; Amsterdam, the Hague, and Philadelphia, 16; Stockholm and Baltimore, 17; Dresden, 18; Vienna and Turin, 19; Berlin, New York, and Brooklyn, 20; Paris, 21; Christiana, 22; St. Petersburg, 23; Venice, 24; Budapest, Bombay, and Calcutta, 25; Rotterdam, Breslau, and Prague, 26; Munich, 27; Hamburg, 29; Trieste, 30; Copenhagen, 31; Alexandria, 35; Rome, 37; Madras, 43; and Cairo, 51.

MALPRACTICES IN THE PROVISION TRADE.—The London Provision Exchange has started a movement for stopping the malpractices in the importation and sale of food, and bringing about a compliance with the Merchandise Marks Act, Margarine Act, and similar laws by prosecuting defaulters. A guarantee fund to defray expenses has been proposed and £4,000 have already been subscribed.

FOG AND COAL.—One of the recent foggy days increased the coal consumption of one gas company alone by 1,100 tons. That company, it is true, was the largest of the London Gas Companies, but the increase in a day is something enormous. And when that day is multiplied by many and the one company becomes a type of hundreds, the vast increase in the coal consumption during a fog is appreciable, though not definable in figures. Some authorities believe the consumption of coal for gas-making purposes this winter has been in excess of anything previously known.

UNSCIENTIFIC MANIPULATION.—The way in which some chemical operations are conducted may be seen from the following extract from the *Glasgow Herald*:—Inside a small yard, and in a boiler there the three men were preparing rosin. While being stirred, some of the rosin overflowed, and, becoming ignited, set fire to a barrel of naphtha lying, alongside, the contents of which were being pumped into the boiler. The naphtha exploded with great violence, breaking all the adjoining windows. A pane of glass was even broken in the window of a dwelling-house on the top flat at the opposite side of London-street. A piece of the end of the barrel flew over the wall and shot past a constable standing outside, who, turning round and seeing the flames, rang an adjoining fire-alarm. Meantime the employés of the firm who were in the stores ran out to the yard, and seeing two of their fellow-workmen enveloped in flames, threw water over them and extinguished their blazing garments. One has since died.

AMERICAN PETROLEUM.—On January 1, 1888, the total gross stocks, under the influence of the restricted production agreement, had declined to 29,410,000 barrels, or to about 2,100,000 barrels less than on November 1, two months before, or at the rate of about 1,000,000 barrels per month, as compared with 160,000 barrels per month from January 1 to October 1, 1887:—

| In Barrels of 42 Gallons. | Gross Stocks. | Sediment and Surplus. | Receipts from all Sources. | Total Deliveries. |
|---|---|---|---|---|
| January, 1885* | 37,569,100 | 2,497,521 | 1,483,973 | 1,618,712 |
| January, 1887 | 33,126,853 | 3,424,316 | 1,716,114 | 2,048,512 |
| February | 32,939,761 | 3,559,721 | 1,406,483 | 1,724,918 |
| March | 32,779,587 | 3,630,528 | 1,765,907 | 1,990,813 |
| April | 32,952,525 | 3,803,145 | 1,665,810 | 1,657,057 |
| May | 32,889,159 | 4,043,054 | 1,767,448 | 2,065,910 |
| June | 32,884,448 | 4,152,801 | 1,688,785 | 1,798,010 |
| July | 32,912,595 | 4,237,448 | 1,584,532 | 1,637,751 |
| August | 32,576,610 | 4,086,058 | 1,704,404 | 1,884,209 |
| September | 32,179,251 | 3,849,549 | 1,730,614 | 1,886,690 |
| October | 31,534,990 | 3,511,905 | 1,852,563 | 2,151,022 |
| November | 30,440,606 | 3,363,467 | 1,242,638 | 2,183,888 |
| December | 29,410,666 | 3,259,928 | 1,287,015 | 2,208,289 |

* Largest stocks.

In the early autumn it became known that the Producers' Association had formed a compact with the Standard Oil Company to restrict the production of petroleum for six months from November 1. This caused a smart advance in pipe-line certificates to 75c., but it was not sustained by the general public and others, and there was a drop of 13c. After this, in October, the quotation again reached 75c., and when, after November 1, it was seen that there was quite a probability of the restrictive movement becoming successful price readily ran into the nineties, and a few days before the close of the year were oscillating between 98c. and 97c.

THE GAS QUESTION AT WORCESTER.—At a recent meeting of the Watch Committee, the Town Clerk reported that the directors of the Gas Company had declined to submit to arbitration the two remaining points of difference with the committee as to provisions to be inserted in the contract for lighting public lamps; also, that the contracts for the years 1887–8–9, which ought to have been executed prior to 1887, had not been executed.—Mr. Downes pointed out that after paying maximum dividends the Gas Company had been able to increase their reserve fund from £2,221, at which sum it stood in June, 1885, to £3,667 in June, 1887, and this was during a period when the Company alleged the reduction in the price of residuals and other causes made it necessary to increase the charge to consumers.

OTHER GAS QUESTIONS.—It is a very curious coincidence that two of the towns where the illuminating power of the gas is considered unsatisfactory use Hawkins' process for the pumping in of air into the gas before reaching the holder—Salford and Wigan. By this we do not mean to infer that Hawkins' process is a failure, by no means; but we say it does put a very strong temptation in the way of a dishonest gas manager to set his bagpipes running a little harder than usual when the coal-gas is running a little too strong.

The Adulteration of Sherry.—A recent report by the American Consul at Cadiz contains a copy of a letter from the Mayor of Jerez de la Frontera, the capital of the sherry district, to the Governor of Cadiz on the use of German alcohol in the manufacture of that wine. He says that the condition of trade and of the wine market could not be more deplorable. Purchases of the real and renowned old sherries are now very seldom made, the conditions of the industry have wholly changed, and the vineyards, which represent so much capital, have now no value whatever, for the land yields no profit and capital no interest. Musts, which twenty years ago readily sold for from 80 to 90 pesetas per hectolitre, now sell for 13 or 14 pesetas, while first-class wines are still on hand in the cellars. It is a fact that more wine is exported as sherry than the whole district produces, while the legitimate product has no sale. The principal cause of the ruin of sherry, the mayor says, is the enormous adulteration by imported German alcohol.

Terrible Explosion at Cardiff Docks.—One of the most appalling coal-gas explosions that has yet occurred in the port of Cardiff took place recently on board the Russian fore and aft schooner *Martin Michael*, then lying loaded and ready for sea in the West Bute Dock. At the time the explosion occurred the vessel was loaded with 410 tons of coal destined for Lisbon. The captain was in bed, and the other members of the crew, eight in number, were engaged in various occupations on deck when they were startled by seeing a jet of vivid flame shoot up from the fore hatch, and immediately afterwards there was a terrible report. For a second all was confusion, and nothing could be heard but the creaking of timbers and the wrenching asunder of iron bolts, intermingled with the cries of the men who were blown about in all directions. Then the spectators saw that the vessel had been in a moment rendered a complete wreck, so far as her interior was concerned, and it was only because her hull remained intact that she did not at once sink in the dock. The schooner herself is practically as much a wreck as if she had been battered on the rocks during a violent gale. Both her masts are started. Her deck is lifted on the port side quite six feet, the cabins are wrenched and split, the wheel is destroyed, and with the exception of her hull, she is completely destroyed beyond all hope of restoration. On hastening to the scene of the accident the vessel was found to be in a most deplorable condition, the deck having been lifted bodily up to the top of the main rail aft by the force of the explosion, and planks were split up and sent in all directions. The cabin and cook's galley are a complete wreck, and the mainmast, too, appears to have been lifted from two to three feet. The captain of the vessel escaped almost unharmed, but four of the crew received most frightful injuries, one man being burnt so severely that he could not be placed in a cab with the others. It is a marvellous thing that fire did not break out, but this may be accounted for by the fact that the whole of the inflammable gas at once escaped owing to the dismantled condition of the schooner.

The Runcorn Soap and Alkali Company.—It appears from the report of the Runcorn Soap and Alkali Company that the gross profits amount to £32,695. Deducting the usual allowances and including the balance from last year, there is left an available balance of £35,523. It is proposed to pay a dividend of 23s. per share, adding to the depreciation fund £15,000, and carrying forward a balance of £6,723. The meeting was held on Friday, the 3rd inst., at the Law Association Rooms, Liverpool.

Legislation against Aliens in the United States.—In the United States House of Representatives Mr. Chipman, of Michigan, introduced a bill providing for the punishment by fines or imprisonment of any alien who becomes the chief officer, president, superintendent, manager, or director of any corporation, or who takes employment as conductor, engineer, brakesman, baggageman, switchman, or car driver on any railroad, or on any Government or State contract work, or on any vessel which navigates the waters of the United States exclusively.

Suffocated by Limekiln Fumes.—A melancholy affair is reported from Pontsticill, a small village a few miles from Merthyr Tydvil. It seems that some workmen, surprised to find that the house occupied by a young married man named Richard Davies remained closed with no signs of life about, broke open the door and, to their horror, found Davies lying dead upon the stairs, he having been suffocated by the fumes from some adjacent limekilns. The house was filled with noisome odours. Davies's wife and two children were found in bed unconscious, but being immediately carried out they soon recovered.

Practical Test of a Fire Extinguisher.—Last week a practical test of the Grinnell Automatic Fire Sprinkler was given in Stanley-street, Liverpool. The tests were in every way successful, and were conducted by Mr. E. B. L. Morris, of 6, South Castle-street, agent for Messrs. Mather and Platt, of the Salford Ironworks, Manchester, who are the sole manufacturers of the extinguisher. The recommendations of this invention are many, all complimenting the usefulness of the machine.

Trade Convention with Russia.—The St. Petersburg correspondent of the *Daily News* telegraphs:—It is reported negotiations are taking place between England and Russia in order to bring about an Anglo-Russian Trade Convention in the near future. The German Government is paying great attention to this subject, because such a convention would be most prejudicial to German interests.

Mechanical Stokers: Infringement of Patent.—On Saturday last, in the Queen's Bench Division of the High Court of Justice London, Mr. Justice Day had before him the cases of James Proctor, of Manchester, *v.* The Sutton Lodge Chemical Company Limited, who carry on business at St. Helens; as well as three other actions of a similar character. The actions were in respect of the infringement of a patent mechanical stoker, and Mr. Proctor claimed injunctions against the defendants, together with damages. A judgment in favour of Mr. Proctor had been given in the Court of Appeal in a similar case, and the defendants in these cases, which were held over till the Court of Appeal had decided, now consented to judgment being given against them, damages being assessed at £5 a flue by way of royalty. Costs as between solicitor and client were then claimed for the plaintiff, but were now disallowed by his lordship.

Manchester Association of Engineers.—At the last meeting of this association Mr. J. Corbett read a paper on "The Economy of Health in Workshops." The practical problems which required to be solved, he said, were venti lation and heating, lighting by daylight or artificial light, water supply, dining-rooms, etc., and sewering and waste appliances. He thought the most unobservant would admit that by proper attention to health in the workshop any man now working in an uncomfortable and unhealthy shop might be made at least one per cent. abler, more active, and more efficient in his work. Taking an average workman to be worth £100 a year to his employer, this 1 per cent. was £1 per year, or equal to £20 of capital. All that he suggested would not cost £20 per man, in most shops not £5 per man, so he hoped that both on the low ground of mere money value, and on the high ground of duty to those dependent on masters, his paper might convince them of the true "Economy of Health in Workshops."

Manchester Water Supply.—At the last meeting of the Manchester City Council, the Mayor, in moving the adoption of the minutes of the Waterworks Committee, said:—"They had now in stock, including an average yield from the springs, what would give 107 days' supply at 20,000,000 gallons per day. Some people had urged that the Council should begin pumping the wells. The well at Gorton would yield an average of 800,000 gallons in twenty-four hours. To get one day's supply from that source they would require to pump three weeks. To set down apparatus would involve the Council in considerable expense, and by stopping the supply of water to the mains at eight o'clock in the evening for a week they would save more water than if they pumped at Gorton for a month. Every phase of the question of getting more water was under consideration.

The Beauties of Smoke.—A correspondent of the *Glasgow Herald* writes:—"Yet our Exhibition, which should be a model of perfection, exhibiting all the newest methods in every branch, is going to add one more chimney, having 10 boilers or 20 furnaces, emptying their black smoke upon our beautiful park, our university, and our Western Infirmary." The said correspondent seems to forget that exhibitions are no longer exhibitions in the sense they used to be. They are no longer educational institutions simply, but means whereby ambitious nobodies can satisfy their desire for notoriety at the expense of a large body of guarantors. Exhibitions must be made to pay, and the orthodox way seems to be to so tie up the refreshment contractor that he cannot afford to do his duty to the public without loss to himself. Again, the music of an exhibition is a rare cover for many a flirtation and assignation, for which, no doubt, the parties have thanked many an executive committee. Exhibitions *per se* are a delusion and a snare. Let some one try them without music and refreshments.

THE SUGAR BOUNTIES.—On the last day of January, in the Belgian Chamber of Representatives, M. Beernaert, Premier and Minister of Finance, stated, in reply to an interpellation, that no change would be effected in the sugar duties in Belgium in the year 1888-89.

The Austrian Parliament has also resumed the discussion on the Sugar Tax Bill. In the course of the debate the Minister of Finance announced that a conference of Austrian Hungarian authorities on the question would shortly be held for the purpose of considering the International Convention, as proposed by the London Conference, and to decide whether it can be accepted by Austria-Hungary. He took occasion to declare that the Government could consent to the abolition of the sugar bounties only on condition that absolute guarantees were given that all the other States would do the same and would not adopt a system of veiled bounties.

LECTURE AT SILVERTON.—The lecture noticed in a recent number was, it appears, delivered by Mr. J. J. Eastick, and not Mr. S. P. Eastick, as stated.

THE RIO TINTO DISTURBANCES.—The calcination of cupreous pyrites in the open air at the Rio Tinto Mines, seems to have led to very serious disturbances. A riot, in which 12,000 to 14,000 persons took part, has been quelled by the authorities firing upon them and killing ten of the rioters. What trouble they would have saved had they quietly allowed themselves to be poisoned by the sulphurous fumes instead. What ill-nature to refuse the civilising operations of manufacturing chemistry!!

# Queries and Replies.

CALAMINE.—Can any of your readers give me the names and addresses of one or two mine owners or merchants for calamine.—H. B. T.

# Our Book Shelf.

A TEXT-BOOK OF INORGANIC CHEMISTRY. By Prof. Victor von Richter. Third American edition, translated from the 5th German edition, by Edgar F. Smith, professor of chemistry in Wittenberg College, Springfield, Ohio. With 89 woodcuts and a chromo-lithographed plate of spectra; 422 pp. Philadelphia: Blakiston, Son & Co.; London: Trübner & Co.

The work before us presents chemistry to the student in a much different form to that usually written for the beginner reading the English language. We are told at the outset that "Chemistry is that department of natural science which occupies itself with the study of those phenomena in which an alteration of substance has occurred," and not only are the elements and their combinations duly considered, but also the physical character of the forces which act upon them, without going too deeply into the department occupied by physics proper. In most English text-books the physical side is too often overlooked, and this is why chemical engineering has not progressed as rapidly as pure chemistry. In the work before us great prominence has been given to thermo-chemical phenomena, a subject of the greatest possible value to the technical chemist, and will be read with great interest on account of the clear and lucid manner in which the various points have been explained. We cannot in this connection do better than refer to the chapter treating of the critical condition of gases.

The whole subject has been brought down to the latest times; on page 243 *et seq.* we find a very interesting exposition of the Mendelejeff and Meyer periodic system of the elements, while an appendix at page 418 gives our countryman's name (Newlands) as the prior discoverer of the law. The appendix also gives an account of the new metal germanium and its properties, as compared with the predicted properties of eka-silicon, as given by Mendelejeff.

We feel sure the treatise will have a large sale in this country on account of its extremely interesting character, and its departure from the monotony of most text books of chemistry in the English language.

THE GAS ENGINEERS' MAGAZINE. A monthly review of light, heat, and power. John Wright & Co., Birmingham.

For twelve years this journal has been known as "The Gas Engineer," but Feb. 1st, 1888, brings it to us in the form of a Gas Engineers' Magazine, which is full of information of a very readable character. One of the principal chapters is that dealing with residual products. We wish it every success, and hope the rose by another name may smell as sweet.

## THE CONDITION OF THE RUSSIAN AGRICULTURIST.

MR. MICHELL, Consul at St. Petersburg, in his last report on Russian trade, refers to the condition of the agricultural classes in that country. Notwithstanding good crops, the peasant derived no benefit from them, on account of the low prices that prevail for such produce and of low rates of exchange. The competition of India, the United States, Australia, and Chili, is bitterly felt in Russia, where it has reduced grain exports and diminished the prices for the existing exports. The Russian agriculturist also, in the disposal of his crops, is placed under the further disadvantages of imperfect and dear means of transport for his produce, the primitive and slovenly mode of agriculture pursued by him, and the complete ignorance of ruling prices and of the state of the European grain markets. Being, moreover, highly taxed, and burdened with comparatively heavy charges on his land allotment in the shape of redemption dues, the Russian peasant, in order to satisfy the demands of the tax collector at a fixed period, is obliged to sell his produce at any price which the small local dealer may offer him. As an instance of the ignorance of the peasant in the matter of the market value of grain, and of his dependence on the middleman, the Department of Agriculture cites the curious fact that oats of identical quality were simultaneously purchased at Kharkoff, which is an important market-place, for 70c. and 35c. per poud. Russian wheat, flax, and other produce are futhermore driven out of the markets of Europe in consequence of the bad state in which they are prepared for sale, and the dishonest devices to which both grower and middleman have recourse in disposing of these commodities. The condition of the estates belonging to the nobility was as unsatisfactory as that of the peasants' allotments. The nobles' land has been falling into the hands of small tradesmen and usurers, and the Government having established a Peasants' Bank, added a Nobles' Bank to aid proprietors in straits, in order to prevent their total extinction. The Nijni Novgorod fair showed the decline of the purchasing power of the masses resulting from failure of harvests and fall in the price of grain. The transactions at the fair were profitless, for the manufacturers sold mostly on credit at long terms, even at a loss. Bills to the amount of £70,000 were protested on the last day of the fair, and but for free renewals the amount would have been much greater. Peltry, bricks, and horsehair were advantageously disposed of; but the prices of every kind of manufactured article showed a steady decline, owing to over-production and the accumulation of stocks.

# Market Reports.

## LIVERPOOL CHEMICAL MARKET.

THERE is no change to report in the market this week. Soda ash is ¾½d. Caustic soda: 60 per cent. white at £6. 2s. 6d.; 60 per cent. cream, £6; and 70 per cent. white, £7. 2s. 6d. Bicarbonate, £6. 10s. Nitrate of Soda: There is little improvement at 9s. 6d. to 10s. 0d. Soda crystals, £2. 12s. 6d. Silicate of Soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100 degrees solution, £4 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder, £7. 15s. to £8 for hardwood, and £7. 10s. for softwood. Saltcake, 22s. Bichromate of potash, 4½d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6 7/8d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 26s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11. Lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper somewhat easier at £23. 10s. Blanc fixe, £8. 10s. Manganese: Sulphate, £20; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) scarcer at 45s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 32s.; grey, 31s. Refined borax, £24 to £26. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur,

7d. to 8d. per lb. Liquid ammonia ·880, 3⅜d.; ditto ·700, 3½d. Montreal potashes, 24s. Chloride of zinc (solid), £18. Hyposulphite of soda, dry and white, £5. 15s. Pearl ash, 40s. to 42s. 6d.

## THE LIVERPOOL MINERAL MARKET.

The market has maintained the improvement last reported, but there has been little change in prices. Manganese: Prices remain unaltered. Magnesite without change at 30s. to 35s. for raw lump; raw ground, £6. 10s.; calcined ground, £10 to £11. Bauxite (Irish Hill brand) is largely inquired for, and prices are firm at 20s. for lump; seconds, 15s.; thirds, 12s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: There have been a few small arrivals, but prices remain unchanged at 80s. to 85s. for medium. Barytes (carbonate): Best quality still continues scarce, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s. Sulphate unchanged; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-stone: Still more inquiry; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Purple ore 6s. Emerystone continues inquired for, but prices are unchanged at £5. 5s. to £5. 15s. for lump; smalls, £5. Fluor and felspar quiet. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet, but prices are unchanged. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore has still improved in demand, and prices are stronger, Antimony ore, £8 to £10 for fair quality. Antimony metal from £31 to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to 15. Potter's lead: Smalls, £10. 10s.; selected lump, £12, 10s. Calamine quiet; 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump, £25 to £35; good, £20 to 21; chips, £8 to £16. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; good, £8. Ground mica, £50.

## THE LIVERPOOL COLOUR MARKET.

Prices are unchanged. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s.; Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of Zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge, Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

The feature of the most note is the progress made towards combination between the Scotch and American oil producers. The success of the effort, at least in its initial or tentative stage, is now held as assured; but whether the co-operation is to last any considerable time represents a question which is very variously answered. No important change in the general market has taken place; caustics may be taken as slightly easier, and sulphate of ammonia has suffered a further drop of 5s. In the case of the latter, however, holders seem willing to stand the hazard of a recovery, for there is no great eagerness to place at current value, and the business is confined to spot for the most part. Buyers and sellers, alike, fight shy of forward engagements. There has been less done in bleaching powder, but bichromate of potash, long rather poorly, has been getting into a more promising out-going bulk, being for the time fully more inquired after than its rival, bichromate of soda. Chief prices current are:—Soda crystals, 41s. net, Tyne; Alum £5, less 2½ %, Glasgow; borax, English refined, £31, and boracic acid, £46 net, Glasgow; Soda ash, 48/52°, 1d., less 5 %, Tyne; caustic soda, white, 76°, £8. 2s. 6d., 70/72° £6. 17s. 6d. to £7, 60/62° £6, and cream 60/62° £5. 17s. 6d. to £6, less 2½ %, Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net, Tyne; refined alkali, 48/52°, 1⅛d., less 2½ %, Tyne; Saltcake 21s. 6d., less 2½ % f.o.r., Glasgow; bleaching powder £7. 15s. to £7. 17s. 6d., less 5 % f.o.r., Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 % and 6 %, to Scotch and English respectively; nitrate of soda, 9s. 6d.; chlorate of potash, 6½d., less 5 %, any port; sulphate of ammonia, £12. 5s., f.o.b. Leith; paraffin scale: hard 2½d., soft 2d. Paraffin wax: 120° semi-refined 3d. and remelted 2½d. Paraffin spirit, 6d. Burning oil, 6½d. to 8d. Lubricating oil, 885°, £6. 10s. to £7. Sulphate of copper, £23. Glasgow imports have included 1,600 tons pyrites, and 700 tons iron ore; Greenock, 6,200 bags, and 6,637 baskets sugar.

## MISCELLANEOUS CHEMICAL MARKET.

Business generally is unusually quiet for the period of the year, and with few exceptions chemicals are at a discount. Sulphate of ammonia has given way again during the week. Nitrate of soda nominally maintains its price, but there is very small business doing in it. Superphosphates are again lower. Prices of copper are hardening again, and lead is also dearer. Salts of copper and lead are nominally unchanged; but, with a better demand, advances may be looked for. Zinc is lower, but chloride of zinc is moving off freely at slightly higher prices. Acetates of lime are still quiet, but prices are firmly maintained. Acetic acids are, if anything, a shade lower. In tar products the demand all round is fairly good. B quality anthracene is receiving some attention, and solvent naphtha is also in good demand. Carbolic acid crystal is more inquired for, 1s. 2½d. to 1s. 3d. per lb. for 34/35° are about the lowest figures in quantity. Liquid and crude carbolic also maintain their prices. Bleaching powder has improved a little during the week, especially for "hardwood." Price at works for softwood is £7. 10s. per ton. Caustic soda is unchanged. Soda ash and crystals are in moderate demand.

## THE ALKALI TRADE.

Sodas still continue weak, and bleaching powder is not so firm as it was. The salt industry at Northwich is suffering severely on account of the Middlesbrough competition, the owners of this industry having made very severe inroads into the trade of the East coast. Middlesbrough is, of course, very well situated for these markets, and from henceforth the Northwich business will be heavily handicapped. It is stated that the selling price of salt in the Weaver district is now below the cost of production. The strike at the Rio Tinto mines has caused several alkali makers uneasiness, but the crisis seems now over.

## THE TAR PRODUCTS MARKET.

Nothing can be said further regarding the benzol market than has already been said, the situation is unchanged, but the speculators have made up their minds to talk it up still further. Tar distillers should be very careful about the prices they offer for tar, as the present state of the market is, so far as benzol is concerned, extremely unhealthy. Solvent naphtha is in good request, and so is crude carbolic and creosote. Anthracene is very firm and a further rise is expected next week; one shilling has been offered and refused for medium qualities of B, and it is rumoured that 1s. 6d. will be asked and paid in London for A quality. Pitch has mended a little, and we hear of an advance of sixpence having been paid in several instances.

## THE SULPHATE OF AMMONIA MARKET.

The markets have been dull during the whole week, and though now quiet prices are steady at £12. 2s. 6d. to £12. 5s., Hull, and £12. 2s. 6d. Leith. Beckton price is £12. 12s. 6d., but outside makes have been sold at £12. 10s. to £12. 12s. 6d. The continental demand is very small indeed, consumers

having been led to expect a much larger fall in values, and they are now holding off in the expectation that their hopes will be realised. It remains, therefore, for the makers to endeavour to find other markets for their production, and to sell it around them at home.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

Hyman & Harley, Birmingham, brassfounders and metal workers.
Hohenhausen & Co., Manchester, manufacturing chemists.
Gaskell, Deacon & Co., Widnes, alkali and chemical manufacturers, as far as regards A. Deacon.
James & Rosewall, Plymouth, lead manufacturers, and oil, colour, and glass merchant, as far as regards E. James.
Mellor, Taylor, & Co., Burslem, earthenware manufacturers, as far as regards R. White.
Winkworth & Co., Hackney-road, London, leather merchants, as far as regards E. Welling.
H. J. Oxman & Co., Manchester, gas engineers.
J. Wright & Co., Tipton, engineers and boiler makers.
Roberts Brothers, Pontardulais, Llandilo Talybont, Glamorganshire, maltsters and brewers.
Millard & Walker, Leeds, paint and colour manufacturers.
Jeffery & Richardson, Leeds, leather dressers.
Goodlass, Wall & Co., Liverpool, paint, colour, and varnish manufacturers, as far as regards J. Gunning.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Shirt, George Edward. New Park-road, Brixton Hill, London, oil and colourman.
Faulkner, John, Manchester, electric engineer.
Hall, Robert, Bolton and Turton, oil and tallow merchant.
Osbourn, James Henry, Kingston-upon-Hull, engineer, contractor, machine and metal broker.
Watson, Lewis & Birkett, Joseph, Cleckheaton, curriers and leather dealers.
Pickover, Johnson & Carruthers, David (trading as Pickover & Co.), Burnley, drysalters.

#### Adjudications.

Forster, George Richard, late of Carshalton, now of Sutton, Surrey, and Hyatt, Robert Russell, Leigham Court-road, Streatham, lately trading in partnership as G. R. Forster & Co., Bermondsey-street, London, hide and leather factors and merchants.
Faulkner, John, Manchester, electric engineer.
Hall, Robert, Bolton and Turton, oil and tallow merchants.

#### First Meetings and Public Examinations.

Elworthy, King's-road, Peckham, London, mineral water manufacturer. First meeting Feb. 10, 33, Carey-street, Lincoln's-inn. Public examination, Feb. 24, 34, Lincoln's-inn Fields.
Hall, Robert, Bolton and Turton, oil and tallow merchant. Feb. 14, 16, Wood-street, Bolton. Feb. 20, County Court, Bolton.
James, Louisa Jane (trading as Louisa Jane Roberts), Llanfairpwllgwyngyll, Anglesey, brewer. Feb. 13, Queen's Head Café, Bangor. March 1, Court House, Bangor.
Watson, Lewis, & Birkett, Joseph, Cleckheaton, curriers and leather dealers. Feb 15, Official Receiver's Chambers, Bradford. March 16, County Court, Bradford.

#### Notices of Dividends.

Stott, James, Westhoughton, Lancashire, formerly trading as the Atlas Foundry Co., at Farnworth, mining engineer, formerly ironfounder. First and final dividend of 2s., any day, 12, Acresfield, Bolton.
Wingfield, William, St. Leonards-on-Sea, engineer. First and final dividend of 2s. 9d., Feb. 13, Official Receiver's Office, Brighton.
Carrick, William, Winchester, brewer. First and final dividend of 2s. 1¼d., Feb. 13, Official Receiver's Office, Southampton.
Ives, George, New Scarborough, near Wakefield, grease manufacturer. First and Final dividend of 1s. 2¼d., Feb. 13, Official Receiver's Office, Wakefield.

# New Companies.

Anglesey Limestone Company Limited.—Capital, £100,300 in £100 shares.
Ashley Patent (Machine Made) Bottle Company Limited.—Capital, £200,000 in £5 shares.
Henry Mitchell & Company Limited (Brewers).—Capital, £450,000 in £10 shares.
Hull Tallow Refining Company Limited.—Capital, £10,000 in £1 shares.
Improved Safety Gunpowder Company Limited.—Capital, £10,000 in £1 shares.
Liverpool & District Mineral Water Manufacturers' Association.
Manchester Brewery Company Limited.—Capital, £350,000 in £10 shares.
Manvers Main Colliery Company Limited.—Capital, £420,000 in £100 shares.
Series Electrical Traction Syndicate Limited.—Capital, £30,000 in £1 shares.
Swansea Oil and Grease Company Limited.—Capital, £15,000 in £10 shares.
J. L. Wade & Co. Limited (Manufacturing Chemists). — Capital, £10,000 in £1 shares.
Weaver Hall Brine, Salt, & Chemical Company Limited.—Capital, £150,000 in £5 shares.
Wholesale Stationers and Paper Makers' Company Limited.—Capital, £20,000 in £1 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

### NOTICE.

**The notices which have hitherto been sent by the Comptroller of the Patent Office to applicants for Patents, reminding them of the date for filing a Complete Specification, will not in future be issued. Patentees, Beware!**

#### APPLICATIONS FOR LETTERS PATENT.

**A New Non-Intoxicating Beverage.** A. W. Martin. 1234. Jan. 27.
**Portable Electric Lamp.** H. Lucas. 1243. Jan. 27.
**Steam Disinfecting Apparatus.**—(Complete Specification.) J. B. Alliott and J. M. C. Paton. 1245. Jan. 27.
**Water-Driven Electric Generator.** M. Immisch. 1250. Jan. 27.
**A Disinfecting Gas Producer.** J. Royston. 1253. Jan. 27.
**Incandescent Lamps.** J. Spink and C. Gauzentes. 1254. Jan. 27.
**Soda Water Machinery.** J. P. Jackson. 1256. Jan. 27.
**Steam-Heating Apparatus.** J. J. Royle. 1259. Jan. 27.
**Manufacture of Nitric Acid.** W. Donald. 1270. Jan. 27.
**Relieving Gas Retorts from Pressure.**—(Complete Specification.) T. Settle. 1274. Jan. 27.
**Fireproof Curtains for Theatres.** G. Garrod, C. W. Bradshaw, and S. Ball. 1280. Jan. 27.
**Smokeless Fireplace.** J. Lyle. 1282. Jan. 27.
**Hydrostatic Motors.** J. A. Rowe. 1293. Jan. 28.
**Waterproof Asphalt and Concrete Roofs.** J. Cliff. 1294. Jan. 28.
**Economising Fuel.** J. Cooke. 1309. Jan. 28.
**Taps for Measuring Liquids.** J. Carter and H. C. Boughton. 1314. Jan. 28.
**Gas from Liquid Fuel.** C. Brotherhood. 1315. Jan. 28.
**Reservoirs of Oil Stoves.** H. W. Wright. 1319. Jan. 28.
**Sanitary Disinfecting Apparatus.** W. C. Roberts. 1326. Jan. 28.
**Steam Boilers.**—(Complete Specification.) O. H. Gentry. 1329. Jan. 28.
**Purification of Sink-Water.**—(Complete Specification.) R. Nicholls. 1337. Jan. 28.
**Blue and Blueish Azo Dyes.** B. Willcox. 1346. Jan. 28.
**Recharging Stale Beer with Carbonic Acid Gas.** J. A. Wilson. 1353. Jan. 30.
**Heating Feed-Water for Steam Boilers.** R Howarth. 1355. Jan. 30.
**Immersion Rollers.** T. Winter. 1357. Jan. 30.
**Treatment of Alkali Waste.** J. Hargreaves, T. Robinson, and J. Hargreaves. 1371. Jan. 30.
**Miners' Lamps.** J. Moss. 1380. Jan. 30.
**Electro-Motor and Current Meter.** F. Borel and E. Paccaud. 1385. Jan. 20.
**Annealing Kilns.** G. F. Chance. 1385. Jan. 30.
**Filtering Saccharine Fluids.** B. E. R. Newlands and J. B. Alliott. 1392. Jan. 30.
**Sulphurous Acid for Disinfecting.** J. Hanson. 1393. Jan. 30.
**Storing and Pulverising Granular Substances.** A. E. Kitson and B. Holmes. 1400. Jan. 31.
**Refrigerating Processes.**—Complete Specification.) W. P. Thompson. 1419. Jan. 31.
**Steam Jet Pumps.** C. S. Maden. 1426. Jan. 31.
**Apparatus for Wine Making.** A. Velluet. 1434. Jan. 31.
**Purification of Water.** T. W. Duffy and T. C. Fawcett. 1445. Jan. 31.
**Annealing Thick Plate-Glass.** D. Gilles. 1449. Jan. 31.
**Application of Metals to Metals by Electricity.** R. K. Boyle. 1461. Jan. 31.
**Carbolic Acid Lozenges.** O. Rademann. 1463. Jan. 31.
**Explosive Compounds.** A. V. Newton. 1469. Jan. 31.
**Safety Fuses.** A. V. Newton. 1470. Jan. 31.
**Manufacture of Explosives.** A. V. Newton. 1471. Jan. 31.
**New Colouring Matters.** J. Imray. 1472. Jan 31.
**Atmospheric Gas Burner.** W. Cluse. 1477. Jan. 31.
**Oil Lamp Burners.** F. R. Baker. 1485. Feb. 1.
**Treating Sulphides of Sodium and Potassium to obtain Sulphuretted Hydrogen.** A. M. Chance and J. F. Chance. 1495. Feb. 1.
**Lamps.** R. D. Bowman. 1508. Feb. 1.
**Accelerating Draughts of Furnaces.** J. McLaren. 1512. Feb. 1.
**Lamps for Burning Oils and Liquids.** W. W. Harverson. 1514. Feb. 1.
**Machines for Cutting Clay.** C. A. Eissner. 1515. Feb. 1.
**Distribution of Electricity.** L. E. Solignac. 1525. Feb. 1.
**Production of Malt.** C. D. Abel. 1528. Feb. 1.
**Production of Maltose Powder.** C. D. Abel. 1529. Feb. 1.
**Sulphide of Zinc.** J. Wilson. 1546. Feb. 2.
**Refractory Material for Furnaces.** J. P. Guy. 1549. Feb. 2.
**Producing Currents of Air, Water, or other Fluid.** A. Murray. 1554. Feb. 2.
**Yeast.** W. S. Squire. 1558. Feb. 2.
**Chlorate of Potash.** C. N. Hake. 1560. Feb. 2.
**Chlorate of Potash.** C. N. Hake. 1561. Feb. 2.
**Animal Food.** T. R. Elt and R. J. Ames. 1562. Feb. 2.
**Chlorinating Ores.** E. N. Barnard. 1569. Feb. 2.
**Fast Toluidine Black.** J. C. Newburn. 1571. Feb. 2
**Steam Boiler Furnaces.** J. M. Brand and J. Hill. 1574. Feb. 2.
**Lubricants for Wire-Drawing.** A. H. Crosfield. 1577. Feb. 2.
**Utilising Explosive Gases for Engines.** G. Wilson. 1588. Feb. 2.
**Evaporating and Cooling Apparatus.** H. E. Newton. 1589. Feb.
**Explosive Compounds.** C. D. Abel. 1591. Feb. 2.
**Colouring Matters.** H. H. Leigh. 1593. Feb. 2.

# PRICES CURRENT.

[THURSDAY, Feb. 9, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 9 | 6 |
| ,, Glacial | per lb. | 0 | 0 | 6⅜ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 4⅛ |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 7 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) | ,, | 1 | 6 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 7 |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 13 | 9 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3⅛ |
| ,, =24° | ,, | 0 | 0 | 1⅝ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 0 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 10 | 0 |
| ,, ,, (grey), Hull | ,, | 12 | 5 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9⅜ |
| Aniline Salt ,, | ,, | 0 | 0 | 8⅜ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 15 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 10 | 0 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 9 |
| ,, 50/90 ,, | ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 3 |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 4 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1⅜ |
| Copper (Chili bars) | per ton | 76 | 15 | 0 |
| ,, Sulphate | ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 70 | 0 | 0 |
| Glycerine (crude) | ,, | 33 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 16 | 15 | 0 |
| ,, Litharge Flake, ex ship | ,, | 16 | 10 | 0 |
| ,, Acetate (white) | ,, | 28 | 0 | 0 |
| ,, ,, (brown) | ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 0 | 0 |
| ,, Nitrate | ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 17 | 6 |
| ,, ,, (grey) | ,, | 14 | 0 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 18 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent | ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 9 |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 4 | 6 |
| Cotton-seed | per ton | 21 | 10 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 7 |
| ,, American | ,, | 0 | 0 | 7⅛ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 6⅛ |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 0 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % | per ton | 9 | 15 | 0 |
| ,, Muriate, 80 % | ,, | 8 | 5 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 8 1/16 |
| ,, Nitrate | ,, | 0 | 2 | 9 |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) | ,, | 2 | 7 | 6 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 20 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 30 | 10 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 8 | 10 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 12 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 17 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 18 | 9 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 16 | 3 |
| ,, Bicarbonate | ,, | 5 | 10 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 6 |
| ,, Nitrite, 98% | per ton | 29 | 10 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5⅜ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 17 | 6 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 7 | 6 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 14 | 7½ |
| ,, Cane | ,, | 0 | 18 | 0 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 8 |
| ,, Barium | ,, | 0 | 0 | 5½ |
| ,, Copper (pure) | ,, | 0 | 1 | 3 |
| Sulphur (Flowers) | per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 0 | 0 |
| Tallow | ,, | 26 | 15 | 0 |
| Tin (metal) | ,, | 165 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) | per ton | 18 | 15 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, February 18, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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The yearly Subscription, commencing at any date, to the *Chemical Trade Journal*,—payable in advance,—including postage to any part of the world, is 10s. 6d. Readers will oblige by making their remittances for subscriptions by Postal or Post Office Order, crossed. The charge for a Postal Order for 10s. 6d. is one penny.

Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.

## "THE SCHOOLMASTER IS ABROAD."

IN our third number we gave to the world the first intimation of a new heat engine, which was then in course of development, and in which we detected a proximate revolution in the mode of transforming heat into mechanical energy. In our thirty-third number we gave a full description of the working of a second engine, with an illustration of it, not from any desire to "poach upon the preserves" of our engineering contemporaries, but because the Hargreaves thermo-motor utilised certain chemico-physical forces hitherto considered outside the domain of the practical engineer. Engineers who have seen the first *experimental* engine, have left the physical reactions entirely unconsidered, considering the machine as the only thing deserving attention, calling it "an uncouth, misproportioned, noisy rattletrap," without so much as a dab of paint to set it off with. The sticks, pieces of string, and indiarubber, and other make-shifts and dodges, for quickly and cheaply varying the conditions of the experiments, and which to a chemist showed the work of an old laboratory hand, would appear to them to be but so many slovenly, clumsy botches, worthy only of a tinker or cobbler. But knowing that the work was in the hands of somebody with a clear idea of the problem, and "grit" enough to stick to it till finished, we did not hesitate to foretell its ultimate success.

Since then our contemporary, *The Engineer*, has seen that there is "something in it," and has given, in addition to a facsimile copy of our own illustration, an excellent full-page sectional drawing of the motor, and a fairly passable letterpress description of it *as a machine*. From this has arisen a discussion in the pages of our contemporary.

Having said so much by way of text, and to furnish a peg on which to hang our sermon, we wish to point out the significance of the correspondence—as far as it has gone.

Professor Smith, of Mason College, Birmingham, begins his criticism by gravely asking why the air is not drawn from the ends of the tubes which pass through the saturator?—that is—why the exhaust air is not used over and over again after having been deprived of its oxygen!! One would expect that a professor who teaches anything about heat engines would at least know something of the chemistry of combustion, especially in the centre of a district whose wealth or poverty depends upon the more or less intelligent application of it. Seeing such a spontaneous and unsolicited exhibition of ignorance, has confirmed our not too flattering opinion of these professors as a class, and also of the manner of selecting them. The gentlemen whose judgment forms the basis of this selection are very apt to forget, or most likely never knew, how often the chemist has been the forerunner of the engineer; or that the prime factor in all heat engines is the chemical reaction called "combustion." Without Dr. Black's theory of latent heat, James Watt's victories could never have been won, and besides, James Watt was himself no indifferent chemist. Our own immortal John Dalton's contributions to science are hardly yet appreciated by some engineers. His law of diffusion of vapours has been for over half a century at their service, but has been left lying dormant and unrecognised as a source of power until another chemist has arisen to apply it as an engineering factor. To a student of John Dalton's own teaching, and by the application of the experimental methods of the chemical laboratory, the world is indebted for demonstrating beyond possibility of doubt or dispute, the quantitative equivalence of chemical action, heat, mechanical energy, electricity, light, magnetism, gravity, and vital force; and for pointing out to the more progressive engineers the way to increase so notably the efficiency of the steam engine.

What are the qualifications of the gentlemen upon whose judgment the selection of professors depend? How do they decide upon the merits of the candidates for such important and responsible positions? What are likely to be the capabilities of students whose knowledge of natural forces is dependent on such professors? These questions we respectfully submit to the consideration of those who have in their charge the government of the various collegiate institutions in the country. The engineer of the future will have to regard the heat motor, not from its constructive point of view alone; but as an apparatus in which given chemical and physical reactions are being carried on and repeated. In the absence of a truly scientific grasp of these reactions he is unfit for the profession of a teacher. Other nations are keeping an eye on this matter, and if the above warning goes unheeded, England may awake some morning to find herself the laughing-stock of Europe, and America, and even of Japan.

We do not expect every college to be furnished with a Rankine or Fleming Jenkin—such men are too scarce for that; but their managers can take care that those whom they select must at least know that deoxidised air cannot be used over again for combustion.

It may be objected, that Professor Smith has since withdrawn his question by another letter of a week later date. To a chemist it seems strange that such a question should ever have been formulated—it is evident that the Professor has discovered the absurdity of the position he had taken up, or had it pointed out to him by some one whose chemical knowledge was better than his own. In any case the fact remains that at least one professor of engineering was ignorant of the laws which regulate that which is the primary cause of mechanical power in every form of heat motor.

## THE NEW FRENCH LAW FOR THE REPRESSION OF FRAUD IN THE MANURE TRADE.

Art. 1.—Those who sell or offer for sale, manures or fertilisers, and shall have deceived or attempted to deceive the buyer, either as to their nature, their composition, or to the mixture of the useful elements which they contain, or upon their production, or by the use of a name which has been given to other fertilisers, shall be punished by imprisonment from six days to one month, and a fine of from 50 to 2,000 francs, or the one or the other of these two punishments only.

For a repetition of the offence within three years the punishment can be raised to two months' imprisonment and a fine of 4,000 francs.

The foregoing to be without prejudice to the application of paragraph 3 of the 1st article of the law of March 27, 1881, relative to frauds on the quality of articles sold, and of articles 7, 8 and 9 of the law of June 23, 1857, concerning trade marks and commerce.

Art. 2.—In the cases mentioned in the preceding article, in addition to the fines noted above, the tribunal can order that the judgments against the prisoner, either by extract or wholly, shall be published in certain newspapers and affixed on the doors of the house, or of the stores of the seller, and also upon the doors of the court house, of his domicile, and at the house of the buyer.

If the offence be repeated within five years, these publications and notices shall always be prescribed.

Art. 3.—They shall be punished with a fine of from one to fifteen francs inclusive, who *at the moment of delivery* have not made known to the buyer in the conditions indicated by Art. 4 of the present law, the natural or industrial production of the manure or fertiliser sold, and its approximate strength in fertilising constituents.

In cases of a repetition of the offence within three years, the punishment of imprisonment for five days or more shall be applied.

Art. 4.—The information which is mentioned in Art. 3, shall be furnished either in the same contract, or on the counterfoil delivered to the buyer at the moment of sale, or upon the invoice given on the delivery of the goods.

The composition in fertilising constituents shall be expressed by the weight of nitrogen, phosphoric acid, and potash contained in 100 kilos. of the manufactured article such as is sold, with an indication of the nature of the state of combination of these bodies, following the prescribed regulation of public administration spoken of in Art. 6.

When however the sale shall have been made upon the stipulation that the price be fixed after an analysis shall have been made of the sample, taken upon delivery, the indication of the exact strength is not obligatory; but mention is to be made of the price of the nitrogen, the phosphoric acid, and the potash in the purchased manure, and of the state of combination in which the fertilising principles are to be found.

The proof of the accomplishment of the foregoing prescriptions may be furnished, in the absence of any preliminary contract from the accused, by proof of its reception by the buyer; by the production of copies of letters from the seller; or by the production of his invoice book, kept regularly from day to day, and containing the statements prescribed by this present article.

Art. 5.—The arrangements made by Arts. 3 and 4 of the present law are not applicable to those who have sold under their usual denomination dung, fœcal matter, composts of night-soil and refuse of towns, market sweepings, brewery residues, varech, and other marine plants for manure, fresh waste from abbatoirs and chalk pits, fish-shells, shell-sand, lime, plaster, and ashes or soot arising from pit coal or other combustible.

Art. 6.—A regulation of public administration prescribes the process of analysis to be followed for the determination of the fertilising matters existing in a manure, and directs upon all other measures which shall be taken to assure the proper execution of the present law.

Art. 7.—The law of July 27, 1867, is now repealed.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

EXPERT EVIDENCE.—*continued.*

Professor James Dewar, sworn. Examined by Mr. Moulton:—

Professor Dewar, I believe you are Professor of Chemistry at Cambridge and at the Royal Institution?—Yes.

And you have for many years devoted your whole time to chemical investigations?—Yes.

Now, among them have you had occasion especially to examine manganese?—I have.

In what connection?—During the years 1882 and 1883 I determined the atomic weight of manganese, and that directed my attention particularly to its compounds.

That led you I believe to examine very carefully manganese; and for the purposes of this case you have conducted a large number of experiments?—I have.

Well, now first of all, broadly one question. You know the process, the object of which is to be accomplished by the invention described by Spence's specification, do you not?—I do.

It has been described as throwing down a small quantity of iron that existed in alumina cake?—Yes.

Now, generally speaking, Professor Dewar, can that operation, in your opinion, be performed by the addition of anhydrous $Mn\ O_2$ to the solution?—I say that it cannot.

Are there well-known methods of making anhydrous peroxide of manganese?—There are.

Would you mention, say, one or two, or what in your opinion is the commonest method?—The commonest method is to take the natural ore—to select from the ordinary ore of manganese, which is really exceedingly pure commercially, or, as universally advertised, as containing not less than 70 per cent. of manganese. It is very easy, if you choose, to take from the specimens of a very high percentage, which contains 90 per cent., or even a higher rate than that, of peroxide in it; that is a selected piece of pyrolusite. If y

se you can very easily purify that and make it nearly 98 cent. of manganese.

o you agree with what was stated by Mr. Pattinson, apart from the question of iron, I will leave that out—tever else there may be in this native peroxide would not ent the action of the Mn $O_2$, which was there?—I ctly agree with what Mr. Pattinson said.

ow, you say you can go up to almost perfectly pure $O_2$?—I say that with a selected sample you can.

ave you tried that?—I have.

your opinion did you try it fairly, in order to give it all hance of working?—I did.

ill you tell his Lordship what you did and what the t was?—I found it would be necessary to make a com-tive series of experiments in order to clear this in my mind—experiments made with peroxide of manganese ared in all possible ways, and I commenced by making ive experiments in this way:—I dissolved a quantity of ite in sulphuric acid, in the usual way, and after the ion of alumina was made, allowing that portion which insoluble to settle down, I decanted and diluted it to a gth which was practically the same as that mentioned in ifications 1 and 2. I took that as the standard quantity, worked that with relative quantities of the peroxide ired to remove the iron, using as the standard that quan-with that form of peroxide which was most efficient.

ow, take the case of this pure native peroxide?—Pure ve peroxide might be added in a proportion of 10, 20, 30, r 50 times the amount of dry Weldon mud, in the mini-n quantity, which is quite efficient for the purpose, out any effect relatively; but when you accumulate 40 o times the weight I will not guarantee that the iron is a little diminished; but that I attribute to the impurities ch are invariably carried, and which must be present in weight.

ow, dealing with the native ore, will you tell us how you ficially made the anhydrous?—I made it exactly in the mentioned by Mr. Pattinson, which is the simplest one all for making anhydrous in the laboratory—namely, by disation with nitric acid.

ow, is the oxidisation by nitric acid one of the commonest s?—One of the commonest and easiest reagents to apply such a purpose.

ou have got there specimens of the ordinary peroxide, e you not?—I have.

have got specimens of all the peroxides here, and I can w you a specimen of that peroxide. This (indicating) is peroxide made from the nitrate, the artificial anhydrous oxide.

ave you a specimen of the pure native?—I had a speci-n of the ordinary native peroxide here on Saturday.

Ir. Justice Kekewich: Is it any use exhibiting these? ey convey nothing to my mind, and to my eye, and I ture to say that no chemist in the court will say, that is hout looking into it from a chemical point of view.

Ir. Moulton: I know, my Lord, and my only reason for ducing it was that there seemed to be some reason—that as made out to be a totally different thing physically—I wished your Lordship to see that it is a black powder, that both are black powders.

Ir. Justice Kekewich: If Professor Dewar says that that o, it is another thing; otherwise, of course, it will have be decided.

Ir. Moulton: I only wanted your Lordship to see the sical condition; but I will not put it in, my Lord.

Ir. Justice Kekewich: Have you a piece of the ore there, fessor Dewar?—No, I have not, but I could easily get a ce. I had so many of the artificial ones which I had de that I did not keep it, but I had a piece on Saturday.

Ir. Justice Kekewich: I am afraid it was only a pardon-e curiosity which led me to ask it.

Ir. Moulton: Now, you made anhydrous peroxide in the you have described by nitric acid?—I did.

id you try if that would work?—Yes, that was equally ficient with the native peroxide.

ow, will you give us any other way in which you made real anhydrous?—I made it in the same way by oxidisa-, with chlorate of potash. I also made it by treating of the lower oxides with concentrated nitric acid, making $O_2$. Those are two methods well known, for making ydrous peroxide, but all those forms of anhydrous per-e are exceedingly inefficient for this purpose. I said the prepared by means of oxidising by means of treating an mediate oxide with concentrated nitric acid were also lly inefficient.

Now, I should just like you to find the specimen which was got by treating that chlorate of potash. It was thrown down as a precipitate, was it not?—Yes. There are two ways in which you may do it. You may do it either in the dry way by adding the peroxide, or any other oxide that is a lower oxide, to fused chlorate of potash. That would be working at a tolerably high temperature, or you may precipitate the peroxide from the solution by adding chlorate of potash to it. In that case it is precipitated in a very fine powder.

I believe the precipitates thrown down by that generally are fine?—They are fine powders.

I should like that passed up to his Lordship. I know you have it there?—I believe I have the peroxide precipitated from a solution with the chlorate of potash. There is one very great difference that I ought to mention between making this anhydrous peroxide by means of fused chlorate of potash as compared with precipitation. If you make it with fused chlorate of potash you can very easily get a peroxide which will remove the iron.

In what way?—Because the temperature goes so high that a portion of the peroxide is reduced to the lower oxides.

I was going to take those cases in which it does work, presently. Now, Professor Dewar, have you found any mode of preparing pure anhydrous peroxide Mn $O_2$ in which the resulting peroxide will work?—I have not.

Well now, did you make hydrated peroxide in various ways?—I did.

I think I will ask a general question upon that, and leave it to cross-examination. Whenever the result of your process has been the hydrated peroxide, what have you to say as to its working?—I have to say that all forms of the hydrated peroxide work.

Are you able to say that all of them work equally well?—No, I am not.

Will you just tell his Lordship what you have found with regard to that?—You can precipitate a hydrated peroxide in a great many different ways either from the higher oxides or by the oxidation of the lower ones, and these bodies differ very much in the quantity of water—the hydration; and it is chiefly dependent on the temperature at which the reaction is produced. Those forms of the hydrated which contain the largest quantity of water are the hydrates which seem to be most effective. Those hydrates which contain a smaller amount of water seem to have much less efficiency.

And do you agree with what was stated by one of the earlier witnesses that in the Weldon mud they are in a highly hydrated form?—I do.

Have you yourself, Professor Dewar, taken this highly hydrated Weldon mud and dehydrated it?—I have.

Now would that process leave all the Mn $O_2$ that there was there before?—It would.

How did you dehydrate it?—I dehydrated it and oxidised it at the same time by treating directly with nitric acid.

And would that be a mode of fully oxidising it?—That is the simplest mode of transforming the whole of the manganese into anhydrous peroxide.

Now, what was the resulting product—would it work?—The resulting product had just the same inefficiency as that made from the ignition or slow decomposition of anhydrated manganese, which I have already described.

It would not work?—It would not work.

Now, Professor Dewar, have you tried any methods which resulted in the production of what have been termed manganites of manganese or intermediate oxides?—I have. First of all, I should like to prove my paper that I passed up to your Lordship. If I might, I will get them from the witness separately?

Mr. Justice Kekewich: You told me, Mr. Moulton, that you omitted one which you thought was useful. It was Mn O or protoxide of manganese.

Mr. Moulton: What is the chemical formula for protoxide?—Mn O.

And anhydrous peroxide?—Mn $O_2$.

And the hydrated peroxide in its full hydrated form?—Mn $O_2$ $H_2$ O, but as I have said, there are several hydrates.

Which would differ in the quantity of water which they would have?—That is true.

Mr. Justice Kekewich: If you are going to extend that through the whole of the paper you had better do it at once.

Mr. Moulton: Yes, I was going to do it.

Mr. Justice Kekewich: This tabulated form is so convenient that we had better have the notes on it in tabulated form.

Mr. Moulton: Is there such a thing as manganite of

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calcium?—There again, there are more manganites of calcium than one. The simplest form is Ca O Mn. $O_3$.

Mr. Justice Kekewich: He reverses your figures.

Mr. Moulton: There is no difference, my Lord.

The Witness: Or Mn $O_3$ Ca O.

What would the corresponding formulæ be for manganites of manganese?—That would be Mn $O_3$ Mn O.

Is that one of what we call the intermediate oxides?—It is one of them.

Now, another intermediate oxide which is very well known would be what?—$Mn_3 O_4$, which would be two of Mn O and Mn $O_2$.

That would be with two molecules of protoxide?—Yes.

Now would you give some account of experiments in which you obtained one of these manganese oxides and tried it? May I ask first whether you ever obtained it for one of those products of your experiments which were anhydrous Mn $O_3$ which would not work?—Yes, one of the most characteristic oxides is $Mn_3 O_4$, in which we determine the amount of manganese present—that is, by the ignition, at a high temperature, of this $Mn_3 O_4$—so that it is a standard oxide. Then you see, my Lord, at once that it is quite a different colour here. This body (*indicating*), through the ignition of the anhydrous peroxide, instead of being black, is a red oxide.

Mr. Moulton: Pass the anhydrous up as well.

The witness: Your Lordship will see that one is perfectly black powder, whilst this is red. That is obtained from the peroxide by simply igniting it in air.

Mr. Moulton: Now, that came from the anhydrous peroxide, which you say would not work, by ignition. After you had changed it from anhydrous peroxide into peroxide, did you try whether this would work?—I did.

And did it work?—It did.

Now, when it works is there anything in the solution that results, which is derived from it?—When that oxide is tried, when sulphate of alumina is treated with that oxide, manganese passes into the solution. The iron is removed, but manganese passes into the solution.

Now, in your opinion, what does that show as to the composition of that body?—In my opinion it shows that the action taking place in the removal of the iron is essentially connected with a double decomposition, in which either the basic oxide, combined with the peroxide or the water, is being displaced and iron taking its place.

By the basic oxide you mean the oxide of calcium?—The oxide of calcium which was combined there with the peroxide.

Have you found generally that where these intermediate oxides work manganese passes into solution?—Invariably, when either sesquioxide, or three-quarter oxide, commonly called $Mn_3 O_4$ work, manganese passes into the solution.

Now, in your opinion, does that prove really that these are manganites of manganese?—It proves to my mind that the term which a chemist means by manganite of manganese is suitable here, because it represents it here practically as a salt. It is named conveniently in that way. It explains very well the reaction taking place here.

Then on that principle what would you say as to the combination or composition of Weldon mud?—The composition of Weldon mud is well-known to be a mixture, so to speak, of manganite of manganese and manganite of calcium all in a solution, of course, of chloride of calcium.

Is that, in your opinion, a matter which—contested—in which there is a difference of chemical opinion, or is it to be considered a mere hypothesis?—I think the question has risen beyond one of mere theory. The whole basis of Mr. Weldon's successful patent was the discovery that full and very complete oxidisation took place in the presence of an excess of lime; but why and how that was brought about nobody knew, and probably Mr. Weldon did not know at the time he made the discovery; and I am under the impression that I heard so from himself, but subsequently he heard that the whole question had been very carefully investigated by Gorgeu, who has already been referred to. He proved that the peroxide of manganese in the hydrated state had the properties of a weak acid, and then Weldon in his next patent not only adopted that view but confirmed it by experiments, and by two papers which he communicated himself.

And that the hydrated peroxide being a weak acid combined with bases in order to make these manganites, is that so?—Undoubtedly.

Now, I have referred one of the witnesses to a passage in the 1869 patent. Is that, to the best of your knowledge, the chief patent?—That is the great patent.

And does that state Mr. Weldon's view on that poin does.

Now, since that time, what do you say with regard verdicts of chemists upon that?—I saw a paper in the *de Chemie* in 1872 (?), which states that hydrated pero manganese has the properties of a weak acid—t neutralises bases and decomposes carbonates.

Well, we will take those properties as being thos weak acid—they speak more eloquently to you than t and you say that Weldon adopted that?—He did, aft firming it by experiments on a large scale.

Has that been anywhere shaken?—No, the latest i gation has been to substantiate it entirely.

Now, will you give his Lordship some of the ways in you prepared peroxide, which give the result con these intermediate oxides, or manganites of mangan The simplest body to obtain in that form is Tennant' of manganese, obtained by oxidisation of the carbona high temperature. That contains invariably manga manganese, which is in the proportion of one part of pr of manganese with two of peroxide of manganese.

Now, what did you do with Tennant's manganese?— my standard solution, after comparison, the same way others, with some Tennant's manganese that I pr myself.

First say how you prepared it?—I took carbonate o ganese and heated it to a temperature of between 250 a in a current of air, until it was completely oxidised. used that first in this state as I obtained it, and second washing with diluted acid.

Now, you have heard the description from some witnesses for the defendants of their experiment Tennant's manganese. Was your process substantia one that they had used?—Substantially the same.

Well, now, did that work?—It did.

In your opinion what was that due to?—It was due fact that it contained manganite of manganese esse It contained a large proportion of the lower oxide.

Does the fact that that body works and throws do iron in your opinion show that anhydrous peroxi work?—On the contrary, I think, from the fact of its w and it must work if the lower oxides work, that it i clear that this mixture of peroxide with, if you like, th mediate oxides must work. This *(indicating)* is a p made from a carbonate by heating, my Lord *(han specimen to the Judge.)*

Mr. Moulton: Now, would you kindly look at Ky specification—the provisional specification, please, fir

Mr. Justice Kekewich: Mr. Moulton, what are yo to ask me *qua* jury about Kynaston's specification?

Mr. Moulton: I am going to ask whether the pro specification contained a clear definite statement which will work, because, my Lord, I am raising th whether your Lordship fails to decide it in my fav different matter, but I am raising the point that t and true inventor is Mr. Kynaston, because we inven process which we are using, and we applied on Aug 10th for a patent in respect of it.

Mr. Justice Kekewich: You are entitled to say it part of your case that the defendants are not the t true inventors; and therefore you may show of cou Kynaston invented the same thing before, but it mus same thing.

Mr. Moulton: But I am going to preface it wi Assume for the moment that the invention of the de Spence is for the use of hydrated peroxide, or inclu use of it; is there in the provisional specification a s statement of the way to use the hydrated peroxide purpose in Kynaston's specification?

Will you look at Kynaston's provisional speci please?—Would you repeat the question again.

Is there a clear and sufficient statement made of of precipitated hydrated peroxide of manganese purpose of purifying alum solutions from iron in t visional specification?—There is.

And is there with regard to that the removing of ma that would pass into the solution, if any?—When th oxides are used, Yes.

And he says, "With the hydrated peroxide of ma or Weldon mud." Supposing Weldon mud wer would those lower oxides pass into solution?—Invari

Now, kindly turn to the defendants' specificatio heard what Dr. Hurter said, that you could equall by the modes referred to in the claim anhydrous or h peroxide. Do you agree with that?—I do.

ut do you find in that specification any direction that the xide to be used must be used in any special state of sical subdivision ?—I do not.
Ir. Justice Kekewich : I do not think that much matters, jury, but it is not quite the way of putting the question.
Ir. Moulton : I am not quite sure whether it is a proper stion to put at all, my Lord.
Ir. Aston : Had our places been changed my friend would e been up like a shot.
Ir. Justice Kekewich : I daresay, but the more credit to for keeping still, Mr. Aston.
Ir. Moulton : Now, is there anything in Kynaston's thod which has the use of anhydrous peroxide alone, or combination ?—In Kynaston's specification there is not.
low, just one more question with regard to the ways of nufacturing the various forms of anhydrous peroxide that tried. Were those methods recognised and known in a ?—The methods which are given in Watts' Dictionary exactly the same which you will find in any standard book ce 1850.
Ir. Aston : Then they were known in 1882 ?—They were.
Ir. Moulton : And have you tried those ?—I have.
n making the anhydrous, of which you have spoken ?—hich I have detailed already.
Ir. Aston : My Lord, in this case we have had from Pro-sor Dewar, taken very shortly indeed, a great number of periments, and I confess that I feel in a great difficulty, d my friend Mr. Healey, who has heard the whole of the amination, is in a difficulty as to dealing with all those periments we got *en bloc* at once, and I do not think, my rd, that the ends of justice would be at all likely to be feated or interfered with if a certain interval of time were ven to my friend Mr. Healey and myself, with the assistance the gentlemen who are good enough te give us their pro-ssional asssistance, in order to consider that mass of idence.
Mr. Justice Kekewich : That is to say if you are first rnished with the paper which is not yet put in, containing e experiments.
Mr. Aston : Yes, my Lord.
Mr. Justice Kekewich . I suppose, Professor Dewar, that aper does contain the result of your experiments ?
The Witness : The paper I have here is a note of the rious modes in which I made the peroxide and the results, y Lord.
Mr. Aston : Yes ; but, Professor, I want to know whether u have, as I know you have before I put the question, put wn on paper and clearly expressed the experiments you ade, and the results that you have obtained, and to which ur evidence has been directed ?—These were merely various ecimens which I have taken from the laboratory con-matory of what I reported was the result of my investi-tion a year ago.
Mr. Justice Kekewich : It is not a question about those tle bottles, but as to the result of your experiments on per. Is that the result on paper in an intelligible form ?—am afraid it is not, my Lord.
Mr. Aston : Then the more reason that my friend and I ould have the opportunity of considering Professor Dewar's idence.
Mr. Chadwyck Healey : I have not been able to take a te, my Lord, the speed has been so fast.
Mr. Justice Kekewich : You will not get more experiments an Mr Moulton has brought out.
Mr. Aston : I should not refer to any more, my Lord.
Mr. Justice Kekewich : You see Mr. Moulton has not taken ofessor Dewar through all his experiments, but only two three which answer his purpose, but you are, of course, at erty to begin with Professor Dewar, and say : "What was r first experiment ? then your second, and so on to the ndredth, or whatever it was.
Ir. Aston : Of course I want Professor Dewar's failures ell as his successes.
Ir. Justice Kekewich : I daresay you do.
Ir. Lawson : My friend can ask the details of all his riments if he thinks fit.
r. Justice Kekewich : I shall be much astonished if Pro-r Dewar has not made a great many more experiments Mr. Moulton asked him about, from the course of the nination.
r. Aston : I should ask Professor Dewar to put on paper.
r. Justice Kekewich : You shall have the opportunity of ng what questions you think fit. If Professor Dewar had a paper here as some of the witnesses had, as Mr. man for instance had, you should have had it if I could have made him give it to you, but if he has not, I do not think I can ask him to write out as a supplement to his examination-in-chief what Mr. Moulton has not thought it desirable to ask him. The interests of justice will not be in the least defeated, perhaps advanced, by a proper interval, and you shall call on Professor Dewar for cross-examination to-morrow morning. I think you ought to call him at the first possible opportunity. I mean if there is a part heard witness we will finish him and call Professor Dewar at the close of that witness.

*(To be continued.)*

## VOLAPÜK:

### The New Language of Commerce.

"PÜ KI KIOM STUDOL ?"

FREQUENT allusions to what is called the universal language, Volapük, may have quickened in our readers a desire for precise information on the construction of the tongue, its aims and capacities. It is not the first time that an attempt has been made to found a new language. During the last two centuries efforts both consultative and individual have been made by numbers of eminent men, some of them scientific, others linguistic or literary in their vocation. These attempts all proved abortive, and were in many cases ridiculous, striving for nothing better than a system of symbols, obscure to everybody but the learned and initiated. Monsieur Schleyer, the originator of Volapük, is a clergyman in Switzerland, who has marvellous attainments in the speech of many lands. He is said to have an intimate knowledge of twenty-eight tongues, and is altogether acquainted with fifty-five. Pronunciation in Volapük is invariable. Roots from the Latin, the German, the English, and the other languages of Europe are taken, mostly in monosyllable form, and terminations are built upon these—also in a definite, invariable method—to express number, relation, quality, and action ; it hence follows that if the root-word be known the proficient in Volapük can modify it in all its meanings without hesitation. There are no artificial niceties, there is but a single conjugation, and the irregular verbs, so puzzling in the French language, have actually no existence. Volapük contains eight vowels and nineteen consonants—twenty-seven letters in all. It does not contain q or w. The vowels are a, as in "father ;" ä, as in "mare ;" e, as in "fade ;" i, as "ee" in "deep ;" o, as in "note ;" ö, as "i" in "sir ;" u, as "oo" in "fool ;" and ü, as in French "*pur*" and "*mur*." If two vowels come together, they must not be sounded as a diphthong, but separately. With certain exceptions all the consonants have an English pronunciation. The "c" is sounded as "j" in "jail ;" g is always hard ; h is always aspirated ; j has the sound of "sh" in "shall ;" s has a hissing sound ; and z has the sound of "ts" as in the German word "*zeit*" (time). The last syllable of a word always has the stress of the accent laid upon it. For instance, *tikele*, meaning "to the thinker," is pronounced "tee-kay-lay." The definite article is not translated, and "sembal" is invented for the indefinite article ; while "bal" stands for "one." The addition of "ik" to a substantive converts it into an adjective. From "fam," glory, and "dol," pain, we get "famik" and "dolik," meaning glorious and painful. There is no variation in the adjectives as to gender, number, or case. The addition of o to a noun or adjective converts it into an adverb, hence we have "suo," certainly, "famiko," gloriously, and "doliko," painfully. "Umo" signifies more ; and "üno" signifies the most ; hence the addition of "um" and "ün" to the adjective gives the comparative and the superlative. The numerals are remarkably simple up to ten. They run, "bal, tel, kil, fol, lul, mal, vel, jol, zul, and bals. The addition of s to each of these numbers multiplies them by ten, as "tels," "kils," "fols," etc. The insertion of e after the first number allows any other number to be added, as "balsebal," eleven ; "kilsebal," thirty-one ; "velselul," seventy-five. The suffix "id" gives the formation of ordinal numbers, as "balid," first ; and "ik" added forms multiples, as "telsik," twenty-fold. The personal pronouns, which are declined in a very simple manner, like the nouns, are :—"Ob," I ; "ol," you ; "om," he ; "of," she ; the addition of s gives the plurals. "Oki" is the reflective pronoun, himself, oneself ; "on," one ; "os," it. The possessive pronouns add "ik" to the personal pronouns, as "omik," his ; and s added to the root forms the plural, as "omsik," their and theirs. "Mot e cils ofik" means "the mother and her children." Interrogative pro-

nouns are formed by "kim" and "kif" for who, "kis" for what; and also "kiom" for which and what; as "pü ki kiom studol?" "What language do you study?" In the relative pronouns "kel" stands for who, which, and that, and "kelos" for what. "Bos" means something. Almost without translation, many readers will hit upon the signification of such substantives as are expressed by the following root-words:—Flum (river), fug (flight), kap (head), med (means), pop (people), sap (wisdom), stel (star), stim (honour), lâd (lady), skil (skill), smal (smallness), smok (smoke), ston (stone), fel (field), gan (goose), jön (beauty), nef (nephew), nad (needle), vun (wound). The letter r presents great difficulties to Chinese and the Eastern nations generally. Hence the letter l takes its place, generally speaking, even in such words as "klon," crown; and "spel," hope; and "vol" for the first three letters of world. In many instances the roots are taken from the middle of a word by dropping the initial syllable. For instance, "liv" expresses deliverance, and "mag" expresses image; "nim" stands for animal, and "rig" for original. Contractions are also obtained by dropping the middle letter or syllable. "Pat" refers to nothing in Ireland, but designates particularity; "fem" is fermentation, and "pot" post. Facilities are also given for the formation of compound words, which are joined by the letter "a." "Kilagul" means triangle, "hitatim" summer, "flolatim" spring.

No doubt this language of commerce, when first studied, has vagaries of eccentricity risible to a suggestive mind, and we can well understand that travesties of the most ludicrous description could easily be compounded on all the grand passages in literature.

According to a calculation made by Professor Kirchhoff, of Halle, the language most spoken on the globe, for the last thousand years at least, is Chinese, for it is without doubt the only one which is talked by over 400,000,000 of the human race. The next language most in use, but at a very great distance behind Chinese, is Hindustani, spoken by over 100,000,000. Then follow English, spoken by about 100,000,000; Russian, over 70,000,000; German, over 57,000,000; and Spanish, over 47,000,000.

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The English Trade Marks Protection Act, says the *Chemiker Zeitung*, is even becoming obnoxious to English dealers. "The London newspapers contain communications from commercial circles, according to which the order that every importer has to mark on every package the place of origin of his goods, thus inflicting an injury upon the middle man. A Chinese buyer, for instance, who, when purchasing at an English store, found the word Germany as being the place of production, will in future prefer to go direct to the producer. The consequence of this law can only be welcome to us."

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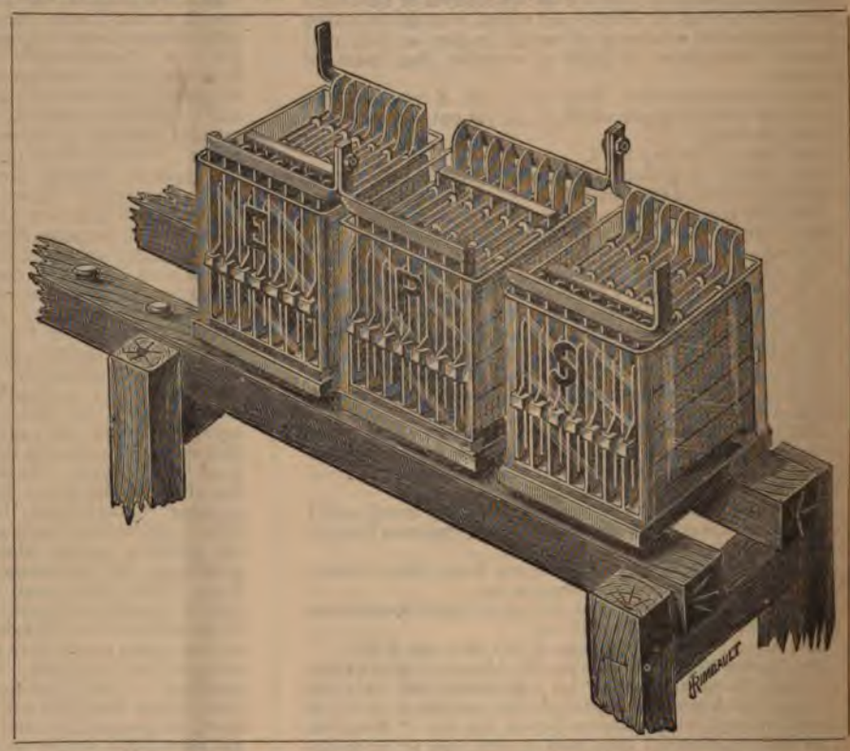
# STORAGE BATTERIES.



IN our issue of January 7th we endeavoured to show how colours might be matched with an arc light supplied from a small dynamo, set in motion when required by the existing motive power of any establishment; but there are many places where the light may be required after the engine has stopped for the night, so that some special arrangement would be necessary for driving the dynamo. This is rendered unnecessary by the existence of storage batteries, or, as they are often called accumulators, or secondary batteries. In a recent number of the *Electrician* there appeared a very interesting account of their use for telegraphic purposes at the Exchange Telegraph Company's offices, where a set of 210 small accumulators have replaced 2,000 primary batteries, the attention required per day being very small indeed, showing them to be useful and economical for such purposes as well as for electric lighting.

In London, secondary batteries are a great boon, inasmuch as they can be charged at a central station quite as readily as ordinary syphons can be dealt with for mineral waters. There is, in fact, in the metropolis no need for troubling with primary batteries for any purpose whatever. In the country things are different, the owners of secondary batteries have to charge them, and for this the dynamo is necessary.

The illustration shows the latest cell of the Electrical Power Storage Company, of 4, Great Winchester-street, which is a very great improvement, mechanically, upon anything which has been hitherto produced, and is already largely used in the City for the purposes of colour matching.

Secondary batteries are necessaries where the supply of power to the dynamo is not regular or continuous, and even when the motor is in constant operation the possibility of failure of the current can only be satisfactorily guarded against by their use. When charged, they can be carried about from place to place, and used for all purposes of temporary lighting. The accumulators of the E. P. S. Co. are of the pattern shown in the illustration, and are enclosed in either glass or teak boxes. The E. M. F. of each cell is about two volts for all sizes, but the capacity in ampère-hours varies very considerably, say from 48 to 660 ampère-hours.

In the case of a dyeworks or paper mill using the electric light a number of these batteries should always be kept charged, and then a light could be readily turned on, even when the engines were stopped. Working direct from the dynamo will always be inconvenient, as in the majority of cases the light would be sure to be wanted when the machinery was idle.

## COMMERCIAL CORRUPTION.

IN an article upon the above subject, the *Gas World* publishes the following :—

I have all my life been connected with gas undertakings, and have a confidential acquaintance with one or two commercial representatives of houses engaged in supplying various material to gas companies, and their practice and experience fully confirm the charges you make against the gas fraternity. They are a corrupt lot, and although they are not alone in this respect in the commercial world, I am decidedly of opinion that through various organisations—trading companies in gas material, etc,—the gas fraternity stands at the top. When I say trading companies I mean limited liability companies got up mainly by gas engineers and gas managers to supply gas meters, purifying material, and gasfittings to gas undertakings. These concerns, in which engineers and managers are shareholders, need little comment, for the veriest fool must see that men in such equivocal positions will always go for their own interests, and buy of the company in which they are personally interested, which practically means they buy of themselves. This they can easily do, for, as a rule, gas directors and corporation gas committees, especially the latter, often know little or nothing about gas management; but whether they do or do not, the principle is one which deserves public exposure, and one which ought to be utterly smashed. It destroys healthy competition, robs gas shareholders and gas consumers, and utterly demoralises gas officials.

One thing ought to be driven home upon gas directors and corporation gas committees, and that is this:—no gas official should be allowed, either directly or indirectly, to have an interest in the supply of gas material. The Government have recently passed such an order upon their officials with respect to Government contracts, and this should be hammered at until the men who control gas undertakings also adopt the same rule.

Without pursuing this line further, as instances might easily be multiplied, we would direct the attention of the ratepayers in towns which carry on their own gas undertakings to the importance of this question to them as a matter of pounds, shillings, and pence, apart altogether from its morality. As a whole, the corporation gasworks of the country show a miserably small return for the money invested in what, if worked with capacity and honesty, is one of the most profitable in the whole range of industries. On a capital of nearly twenty millions, the net profits in 1886 only amounted to £357,000, and the conclusion is pretty obvious that corruption and incapacity have a good deal to do with the want of financial success. We will take the Salford gasworks to illustrate our case. We are informed that a residual product from the Salford gasworks, from which a large profit on gasmaking should be made, has been for years sold at much under its market value, and that thousands of tons have left these works beyond what have been charged and paid for; in point of fact, many thousands of pounds of the ratepayers' money have thus been thrown away by a system of bad management, or even worse. Oxide, which is used in the purification of gas, is required in large quantities. For many years it has not risen above 30s. per ton in the open market, but the Salford gasworks paid as much as 55s. for it, and just prior to the investigation 35s., while since it has been bought under contract at 27s. 6d. The quantity purchased, besides, appeared to have been out of all proportion to the requirements of the works. After the oxide is used, it continues to be a good marketable article, as it is charged with sulphur, which can be extracted. This commodity was sold as low as 17s. a ton to one man, and to another as high as 40s. to 50s., a divergence which the fluctuations of the market cannot account for. As to the quantity, the spent material should show in weight about 60 per cent. more than the fresh, but here again the recorded sales give a less return. We will now try another test. In 1885 the Salford Corporation paid for 80,000 tons of coal, which should have produced, taking the average of 10,500 cubic feet of gas per ton, 840 million cubic feet. The published report gives the quantity as under 800 millions. There is thus a difference of 40 million cubic feet, or, at 3s. 6d. per thousand, £7,000. The amount put down for leakage is also high (8 per cent.), and although the illuminating power is given as 19·16 standard candles, independent tests have shown that it was much lower.

With these astonishing discrepancies it is not surprising that the net profit on the working of the year referred to was not more than £6,000, although more than half a million is invested in the undertaking. Credit is taken for £18,000 of profit, but £12,000 of that amount is set aside to the credit of the gas depreciation fund. Not only does the concern not realise any profits worth speaking of, but the rate charged to the consumers is exceptionally high. A deputation which waited recently upon the Salford Gas Committee showed that the average price charged per thousand cubic feet in eighteen boroughs in Lancashire was 2s. 8½d., as against 3s. 7d. charged by Salford. Altogether, as ratepayers and consumers, the inhabitants of this district are unfortunately placed. According to the Investigation Committee's report, the late Gas Committee "stands discredited and condemned," and yet six of the old Committee are on the new Gas Committee. If the ratepayers of Salford, with the good ground which they have to go upon, would only wake up and demand a Government inquiry, they would not only benefit themselves, but do good to many other communities. It is manifest that the corruption is not confined to the payment of bribes to engineers and gas managers, but extends to the members of gas committees, and the sooner light is let in the better.

## THE SPREAD OF INFECTIOUS DISEASES.

DURING the past few days Salford has been disturbed in various ways, but chiefly resulting from the effects of the "tipping system." The Council seems determined to show the world "how not to do it," and the publication of the following letter to the *Manchester Courier* by John Ed. Morgan, M.D. (M.A., Oxford), Fellow of the Royal College of Physicians, Professor of Medicine in the Victoria University, Physician to the Manchester Royal Infirmary, and to the Smallpox and Fever Hospital, Monsall, may not be without influence in other directions:—

Sir,—The Corporation of Salford have selected a site for their new hospital for smallpox and other infectious diseases. The locality chosen is Bolton Lodge, situated on the Eccles New-road. As one thoroughly familiar with this property, and who, at the same time has seen much of contagious diseases (having been connected with a large fever hospital as visiting physician for upwards of twenty years), I consider it my duty, before it is too late, to direct public attention to some strong objections to be urged against the proposed site; objections which are calculated to show that the situation is singularly ill adapted for the housing and treatment of this class of diseases.

First, as regards the sanitary surroundings on the southern side, at a distance of less than 400 yards, runs the river Irwell, the intervening land consisting of low-lying swampy meadows, periodically flooded by the overflow of its waters, These waters have been described by one who has carefully studied their properties, as "pestilential and poisonous," and as having largely contributed to the high mortality of Manchester and Salford. On the south-east side of Bolton Lodge, at a distance of 187 yards, are the Mode Wheel Sewage Works, here the drainage of Salford (with a population of 228,000 persons) is received into twelve open tanks, 720ft. in length, and 200ft. in width; the foulest portion of the sewage being pumped into the tanks nearest to the proposed hospital site; the effluvia from these works are at times so penetrating and offensive that when the wind blows from that direction, persons passing along the Eccles New-road not infrequently experience a feeling of nausea, oppression, and faintness. I am informed also that diptheria, scarlet fever, and ulcerated throats have prevailed to such an extent in some of the houses adjacent to the sewage works, that these houses may, at the present time, be obtained at nominal rents.

Now, it may be asked, Is such a site as this, so closely contiguous to these large, and peculiarly unsavory sewage works, a suitable locality for a hospital set aside for the reception of infectious diseases? A long experience in the treatment of fevers has taught me that no one factor contributes more powerfully to the recovery of such patients than the purity of the air breathed; and nothing, on the other hand, more surely retards recovery, intensifies symptoms, induces relapses, and in not a few cases actually encourages a fatal termination, than an impure atmosphere, poisonously charged with sewage exhalations. These objections, based on sanitary grounds, must, I believe, when this question is intelligently considered, prove fatal to the scheme. But there are other reasons also, which will necessarily

favour its rejection. In selecting a site for a fever hospital, a spot should be chosen which is, as far as possible, isolated, and is likely to remain isolated, from contiguous dwellings, whether occupied by the wealthy or by the poorer classes. No one acquainted with Weaste and its neighbourhood can for a moment doubt that as soon as the Ship Canal is fairly commenced, and still more when it is finished, the land in this vicinity will be thickly covered with working men's houses. Thus the hospital will not alone adjoin sewage works, and be exposed to the exhalations of a poisonous river, but will likewise be surrounded by dense masses of human beings, to whom it must inevitably prove a source of danger and alarm. If the health authorities of Salford wish to see a really favourable site for a fever hospital, let them visit the wards for infectious diseases which have been erected by the authorities of the Manchester Royal Infirmary at Monsall some fifteen years ago. A more airy, and at the same time a more thoroughly isolated hospital, it would be difficult to discover; the results of treatment in this hospital are singularly favourable and satisfactory, a fact due, I believe, in no small degree to the high situation and breezy influence of the neighbouring hills.

I have heard it argued in favour of the proposed locality, that it is situated on a public highway, readily accessible by road and by rail. In my opinion there could be no stronger objection to the site. If contagious diseases are ever to be successfully combated, it is very necessary that the public should be taught that it is incumbent on them, whenever they are struck down by any of the more fatal of these disorders, such as smallpox, typhus fever, scarlet fever, diptheria, or cholera, to exercise a certain amount of self-denial, and to be prepared to practice the most rigorous isolation from their relatives and friends until all danger of infecting others is passed. At the same time it is by no means desirable that persons employed in such a hospital, whether as actual attendants on the sick or as domestic servants, laundresses, charwomen, should enjoy too ready access to public conveyances. The passengers taken up by a tram at the entrance of a smallpox and fever hospital will justly be looked upon by their fellow-travellers with a certain amount of suspicion.

## KINGSFORD'S OSWEGO CORN-FLOUR MILLS.

THE factory stands on the left bank of the Oswego river, close to the stream, which drives fourteen turbines of 1,200 horse power, and the twenty-two pairs of burr stones which grind the grain manufactured into the various products. It may suffice, in explanation of the size of the establishment, to say that the roofing alone covers five acres, and that some of the buildings are seven storeys in height. At the present time the works are turning out 21,500,000lbs. of corn flour and starch annually, at the rate of 72,000 packages per day, for the packing of which 5,000,000ft. of boards are required. The late Mr. Kingsford was the discoverer of Indian Corn starch, and had his manufacture before the American public in 1842. Beginning business in New Jersey, he finally removed to Oswego many years ago, and it is with this town that the success of the manufacture is identified.

As far as a cursory glance at the various stages of the manufacture enables one to judge, the production of corn flour seems to be a simple process. A slight sketch of the manufacture will perhaps prove interesting. The Indian corn employed in the manufacture is brought from the Western States, and after being roughly ground is run into large vats, holding about 4,000 gallons each. Of these vats 115 are usually worked, in which the Indian meal is stirred and washed again and again. This process is more or less lengthened. The starch being allowed to settle down in the bottom of the vat, the water and refuse are drained off through plug holes ranged up the sides of the vat. After the starch has settled down and the liquid is run off, the vats are refilled with water, the starch stirred up, washed over again and again, and allowed to settle, and this is repeated as often as required. Finally, the starch, mixed with water to a creamy consistence, is drained through the bottom of the vat, and run by movable gutters into long narrow boxes lined with a thin canvas fabric, through which the water filters, leaving the starch like finely-slaked lime, solid enough to be cut into rectangular blocks. These, carefully handled, are carried along a sliding plank, and are lifted by an elevator on which are steps that hold one block only. The blocks are then placed on shelves in a kiln, and dried by steam. The drying is continued till the block is covered with a pale yellow skin. The blocks are removed from the kiln, the skin deftly sliced off, and the block, wrapped in strong blue paper, returned to the kiln and thoroughly dried. The block on being removed from the kiln has shrunk somewhat, and will now measure about nine inches long by six or seven in breadth and depth. On pressure the block crumbles into beautifully white fragments, and is now placed in the various crushing, grinding, or shaping machines which fit it for the market.

The next process consists in packing these products in such quantities and in such styles as fit the trade. One room is surrounded with funnel-shaped fillers, down which the corn flour pours. A young woman sits at each, and placing the ready-made paper case or package under the filler the machine fills it with the exact quantity and no more. But she tests the accuracy of the machine by a small balance at hand, and closes the package, which is then passed on to have the special label pasted on it and made ready for being packed in the well-known boxes one sees in every Glasgow grocery. This work is so smartly done that each young woman fills on an average 2,000 packages per day, and they show the same smartness and neatness at their work as they do in their dress. When at work loose blouses are worn over their street dress and 'kerchiefs over their heads. But some of them, no doubt smitten with their own resemblance to the Court beauties of the old world, leave their hair uncovered to have it elegantly powdered with the corn flour flying about, which at the same time gives a pearly lustre to their cheeks. The photographer could not wish for finer subjects than some of these Marie Antoinettes. The firm manufacture not only their packing cases, but their smallest packages, employing a strong brown cardboard instead of wood-pulp board—getting so largely into use in Glasgow, one reason being the sensitive character of corn flour when placed in contact with any substance from which odours may be extracted. Such care has to be exercised that the wooden cases in which the flour is packed are all of bass-wood, chosen for its perfect freedom from flavour. The packing-box department is a perfect exhibition of mechanical contrivances. No handwork whatever is done, every joint, mortise, and feather being cut by machinery. The joints are fitted without either glue or nails, and a box so accurate in its work I do not suppose could be turned out of Glasgow at any price. But here, as elsewhere in the States, I see one man and a clever invention doing the work of three or four men at home, and doing it a great deal better. The waste of human labour, and consequent loss of money, in the old country must be something amazing. As a consequence, enormous factories are run in the States, and bring in handsome profits, when they would not pay in Glasgow, even with the cheaper wages. A remarkable feature of the Kingsford factory is its fire department. The fire bell summonses two hundred trained firemen out of the works. These wear handsome helmets, scarlet jackets, tomahawks, and other professional gear, and are under such discipline as some of your best Volunteer corps could not surpass. These firemen have a fine band and a practising-room, as well as lecture-hall, seated for about 1,000 people. But the firm has spared no trouble to complete every department of the work, and its business prospers accordingly.

## ON THE POSITION OF THE ULTRAMARINE INDUSTRY IN GERMANY.

THE comfortless position of the German ultramarine industry has not improved during the year which has just closed. On the contrary, owing to over-production and decreased exports to foreign parts, the previously low prices have declined still further. For instance, the turnover of the Hanoverian ultramarine manufactory, formerly Aug. Egestorff, declined from £22,738 in 1885–6, to £22,252 in 1886–7, although the sales during the same periods rose from 1,062 tons to 1,160 tons. The gross profit of the said firm amounts exactly to £16 12s.

The exports from Germany are excessively hampered by the high duties imposed on the article by Russia, Austria, France, and the United States of America. This increases the competition at home, where every manufacturer is anxious to increase his output in order to decrease his cost of production. It is no wonder therefore that ultramarine is frequently sold at or under cost price, in order that even a

single order may not be missed; again, owing to the weakness of some makers the most impracticable concessions are frequently made.

Under these circumstances, it is high time that a stand was made in order to bring production and consumption into proper proportions. The three American ultramarine factories—Messrs. Heller and Merz, the International Ultramarine Works Limited, and Messrs. Hoffmann and Kiessig, have, according to the advices now before us, arranged a union. Would it not be possible to form a similar union of the German ultramarine factories?

Following this article, which appeared in the *Chemiker Zeitung*, an ultramarine manufacturer writes to that paper as follows:—

We greet with pleasure the article contained in No. 4 of the journal under the above heading, inasmuch as the same will be an impetus for the German ultramarine manufacturers finally to work unanimously together with a view of ameliorating our seriously depressed industry.

Attempts at union have repeatedly been made, and following the formation of the "Association of German Ultramarine Manufacturers" no doubt some results have been derived, more especially as regards the equalisation of the packing charges. Unfortunately, two years ago this association was dissolved, and thus the little good that the manufacturers had reaped was lost. For the last two years a "wild" competition has existed among the ultramarine manufacturers; one might almost say that "the battle is being fought out for very existence." The writer of the article in No. 4 with justice states that frequently ultramarine is being sold under cost price in order to secure the order. Would such a state of things be necessary if unanimity existed among the manufacturers? To this query we must reply with a decisive "No."

The consumption of ultramarine has, it is true decreased, partly to its being pushed out by aniline, and partly by the ruling fashions. The introduction of the duty was no blessing to Germany, it has augmented the productive capabilities of the neighbouring countries, more especially of Austria. A convention exists of ultramarine manufacturers in Austria, with the general sale entrusted to one firm in Vienna. Every year, however, immense quantities of the lower grades are thrown into Germany in spite of the duty, at ridiculously low prices, and by this means our prices are ruined.

It has been mentioned previously that the consumption had decreased. In spite of this, however, there is sufficient demand, as appears clearly from the fact that the Hanoverian Ultramarine Manufactory, late Egestorff, during the last business year sold about 100 tons more than in the year previous. We can assume that a corresponding increase of sales, as regards the quantity, would also have been the case with other works. The consumption, therefore, exists, but "where," and why at such depressed prices? The matter is simply this: Over-production is universal, and the excess is bought up by the wholesale dealers. To these gentlemen we manufacturers have to cede the few coppers of profit which yet remain. To this must be added the suspension of several ultramarine manufacturers, who partly cleared out their stocks at any price, solely and entirely for the benefit and profit of the wholesale dealers.

These parcels, obtained at an extremely low price, the dealer gradually places upon the market, but without the actual consumer reaping the slightest benefit. The parcels are sold, the consumer becomes accustomed to the brand, while inquiry again gradually comes in again to the dealer from time to time. It now becomes by no means an easy matter for the dealer to again obtain the same brands and at the same time to retain the job prices. Many manufacturers are now consulted, and in time the dealer meets with his requirements, sometimes here and sometimes there.

Here lies a deep cause for the present condition of our industry. This especially holds good for the current qualities; as regards the finer sorts, specially prepared for scientific purposes, matters are not so serious, although here also the manufacturers undersell each other to an unnecessary degree.

If we now consider how this evil can be obviated, we believe we shall be correct in making the following proposals or suggestions:—

(1) Mutual action among the German ultramarine manufacturers.

(2) Limitation of production in all ultramarine works.

(3) Sales to be made direct to the consumer, whenever practicable, consequently omitting the middle man.

(4) Mutual or general purchase of the stocks of suspending manufactories.

(5) Association of geographically-situated factories with division of labour.

A convention of the Austrian manufacturers was of course an easy matter, inasmuch as in that country only three or four factories exist. By means of a serious effort we in Germany might also succeed in arriving at some arrangement in which each manufacturer would find advantage to himself individually. The more the industry becomes fortified in adjacent countries (more especially in England), the more pressing does it become necessary for us to accept the warning for union.

May these few lines result in my co-manufacturers also giving expression to their views on this important matter.

## THE PURIFICATION OF CRUDE ANTHRACENE.

THIS process is based on the fact, hitherto unknown, that the entire impurities of crude anthracene, inclusive of carbazol, are much more soluble in the pyridine, chinoline, and aniline bases than the anthracene itself, so that by means of one single process it becomes practicable not only to obtain the anthracene at once of a very high percentage, but at the same time to free it from carbazol and its homologues.

The bases of coal-tar furnish a particularly suitable means of solution, as they are contained in the light oils, and can be most easily produced. The capability of these basic substances for enriching anthracene goes so far that they can well be removed by means of benzol or other bodies which act similarly without any very great loss. In a boiler furnished with stirring appliances, which can be heated by means of steam, there are to be placed 1 part of the crude anthracene and 1½ to 2 parts of the rectified tar bases, and heated with agitation until all is dissolved. After the solution has cooled, a fairly pure anthracene crystallises out, and may be separated from the mother-liquor in the customary manner. When the more highly boiling aniline and chinoline bases are employed, it is preferable to remove the same with solvent naphtha. A crude anthracene of about 33 per cent., treated in this manner, furnishes an anthracene of 80 to 82 per cent.

To say that the ready solubility of the impurities of crude anthracene in pyridine and other coal-tar bases has up to now been entirely unknown is not quite correct, as this fact was known in 1878 in one of those factories which was among the first to undertake the purification of anthracene. On the other hand, the process described by the patentee (D.R.P. 42053, April 15, 1887), so far as the technical utilisation of the reaction is concerned, is without doubt something new, and, moreover, possesses the advantage of practical utility. The fact that melted crude anthracene dissolved in coal-tar bases first deposits crystallised anthraene, while the major portion of the impurities remain in the mother-liquor for a much longer time, makes the process an easy one to work, and results in the production of a semi-purified anthracene of high percentage in a simple and economic manner.—*Chemiker Zeitung*.

## PREVENTION OF LEAD POISONING IN GERMANY.

THE Berlin president of police has issued the following order for the security of workmen engaged in potteries against lead poisoning. The order has received the sanction of the chief authorities:—

(1) Only those glazes wherein the oxide of lead is combined with silicic acid, as silicate of lead, may be produced and used.

(2) Muffles and ovens must be so arranged that the plumbiferous vapours cannot escape into the working spaces in front of them, and they should be drawn off at once, either in conjunction with the furnace gases into the smoke washer, or into a specially constructed vapour conduit.

(3) The fine grinding of plumbic glazes must only take place when the mass has been moistened, in order to avoid the formation of dust.

(4) All labourers employed in the pulverising, riddling, and mixing of plumbic glazes, more especially those employed in the cleaning off process of the dried glaze, must have both

nose and mouth covered with a sponge specially cut to shape for the purpose. This sponge must be moistened and washed at least three times a day, in a mixture composed of equal parts of vinegar and clean water, in order to keep it constantly clean. For the carrying out of these orders the foreman is jointly responsible.

(5) The places in which the glaze is produced, as well as those in which the dry glaze is polished up, must be kept thoroughly well ventilated, and must be so situated or so arranged that the fresh air can be let in freely and the foul air expelled. Cellars are not suitable for this work.

(6) It is the duty of the foreman to make the necessary arrangements, so that the workmen may wash themselves frequently, using soap, and to give every facility to the men for rinsing out their mouths and cleaning their teeth, as well as to brush and clean their clothes.

(7) No solid or liquid food, or eatables or drinkables of any kind may be stored or consumed in the workshops.

(8) Infractions of these orders, in accordance with Section 147, Art. 4 of the Board of Trade order, will be punished with fines up to M. 300 (£15), and in the event of inability to pay, with imprisonment.

## TARIFF LEGISLATION AND THE CHEMICAL INDUSTRY.

MR. J. A. WILSON, of Philadelphia, who is connected with the house of Messrs. Powers and Weightman, has written a letter upon the foregoing subject for the *Bulletin* of the Iron and Steel Association, and as the article contains valuable information of interest to the general trade, we give it in full below :—

Tariff legislation has been singularly inimical to the prosperity of the chemical industry of the United States. So far from manifesting a disposition to encourage enterprises already established, and stimulate fresh undertakings, our Government has shown but half-hearted sympathy in the one case, and remained indifferent in the other. A very large number of chemicals used in the arts and manufactures are on the free list, so that the average rate of duties on chemicals in general, free and dutiable considered together, is very low indeed. For example: For the fiscal year ended June 30, 1884, it was 9·6 per cent., and for the fiscal year ended June 30, 1886, it was 11·6 per cent.

Thus it is that inadequate protection to American chemical manufacturers—who, it need hardly be stated, do business under precisely the same conditions as apply to their fellow manufacturers in other departments of industry in the United States—has permitted this country to be flooded with the surplus products of Great Britain and the Continent. During the fiscal year ended June 30, 1886, our importations of these products were as follows :—

| | Pounds. |
|---|---|
| Chloride of lime or bleaching powder ..... | 98,046,208 |
| Soda-ash ..... | 279,931,929 |
| Caustic soda ..... | 77,843,401 |
| Salsoda ..... | 30,687,608 |
| Bicarbonate of soda ..... | 3,220,987 |
| Oxalic acid ..... | 1,488,539 |
| Muriate of potash ..... | 46,804,006 |
| Carbonate or fused potash..... | 4,266,668 |

These figures represent a vast amount of labour and large sums of money-employment to foreign working men, and profit to foreign manufacturers. That money and energy and skill are all to be had in this country cannot be doubted, and it may very properly be asked, Why do we not produce these goods, and in sufficient quantity to supply our own wants? The answer is that it is impossible under present circumstances; that the cost to manufacture them in this country far exceeds that abroad; and that this is mainly due to the difference in wages. It should be remembered that the item of pay for labour not only enters into the cost of making an article from the raw material, as so much per pound, or yard, or ton, paid to the working man in his week's wages, but that it is an important factor in the cost of the utensils, apparatus, and machinery employed, as well as the factory in which the work is done, the office expenses, etc.

The term pauper labour may not be very elegant nor just the proper term to apply when referring to the low wages paid abroad, but whether pauper or princely we have the facts staring us in the face just the same—30, 40, 50, 60, and 80 cents a day paid in some parts of Europe for the same work that receives $1, $1 50, and $2 in this country—and we have the result—inability to compete. We are losing our home market without gaining any foothold in foreign countries.

Some important chemicals, essential to the arts and industries, which are produced in immense quantities abroad, have never been made here on an extensive scale, if at all, and cannot be so long as duties remain on the present low basis, or the articles stand on the free list, as the case may be, or tariff legislation remains the uncertain factor that it is. Let us take, for example, chloride of lime, or bleaching powder, which is on the free list and is not produced here at all. Of this article we imported during the fiscal year ended June 30, 1886, 98,046,208 pounds, valued at $1,354,018.82, not a pound of which can be manufactured here at a profit unless we have a protective duty. There are other chemicals which were once manufactured largely here whose production has been steadily diminished, if not dwarfed or totally abandoned, by the insufficient protection afforded by the present low duty.—*Oil, Paint, and Drug Reporter.*

## THE AMERICAN QUININE TRADE.

SULPHATE of quinine was made free in 1879, but to illustrate fully the effects of legislative action upon this article we will go back a few years beyond 1879 and compare the importations under a 20 per cent. ad valorem duty with the importations which immediately followed the placing of quinine upon the free list. The importations of sulphate of quinine for the past fourteen fiscal years, ending with the 30th of June in each year, have been as follows :—

| Years. | | Ounces. |
|---|---|---|
| 1874 | 20 per cent. duty | 68,097 |
| 1875 | ,, ,, | 12,279 |
| 1876 | ,, ,, | 22,746 |
| 1877 | ,, ,, | 75,804 |
| 1878 | ,, ,, | 17,549 |
| 1879 | ,, ,, | 228,348 |
| 1880 | free | 416,998 |
| 1881 | ,, | 408,851 |
| 1882 | ,, | 794,495 |
| 1883 | ,, | 1,056,764 |
| 1884 | ,, | 1,263,732 |
| 1885 | ,, | 1,390,126 |
| 1886 | ,, | 1,251,556 |
| 1887 | ,, | 1,180,157 |

Not a single ounce of American sulphate of quinine was exported during this period. What other result could have been anticipated than the large importations we have presented above? Other manufacturers, who as yet have not had such heroic treatment applied to them, but whose term may come sooner or later, may feel interested in considering the above exhibit, and possibly be inclined to exert themselves to have this evident injustice corrected. Under moderate protection (and the duty of 20 per cent. ad valorem was a very moderate one) the 2,180,157 ounces of sulphate of quinine made in England, France, Germany, and Italy, and sent to this country for consumption during the fiscal year ending June 30, 1887, would have been manufactured here.

Every American manufacturer should seriously consider these two questions, namely: 1. Will you be able to hold the home market if such goods as you produce shall be removed from the dutiable to the free list? 2. If you cannot hold the home market how can you expect to supply foreign markets?

That an industry whose importance has received general recognition abroad should be held in so light esteem in this country is remarkable; that it should fail to receive the same measure of protection that is accorded to the other great industries is unjust; and that our government should remain indifferent to the importance of having chemicals used in the arts and manufactures largely produced here is a national blunder.—*Oil, Paint, and Drug Reporter.*

Copper in the Animal Economy.—According to F. Sestini the belief that, after a continuous consumption of even small doses of copper salts, injurious effects follow, is an erroneous one. The author states that he and his family have for many years consumed food and wine containing small quantities of copper without there having been any injurious consequences as the result.—*Atti della R. Acc. dei Georgofili*, 1887.

## THE METHYLATING OF SPIRITS.

THE new mixing agent pyridine does not seem to be growing in favour as a methylating agent for spirits. The *Chemiker Zeitung* says:—"We have received the following communication: A petition has been drawn up by myself, and was handed by the Bavarian Industrial Museum to the Bavarian State Ministry. I decided upon this petition in consequence of the most searching experiments—which I partially worked out myself and which were partially done under my own immediate supervision—and arrived at the conclusion that the general mode of denaturing (methylating) spirit is unsuitable for most industrial purposes, both on sanitary as well as on technical grounds. In consequence of further experiments, I came to the conclusion that petroleum should be considered as the most suitable means of methylating. By its use the spirit does not receive any qualities which would render it useless for industrial purposes. By means of petroleum, spirit can be denatured in such a manner as not to injure its efficiency for burning purposes."

## THE MANUFACTURE OF HYPOSULPHITE OF SODA.

A RECENT patent taken out in this country by Mr. T. Raynaud, of Namur, relates to the production of hyposulphite of soda by a somewhat new method to that usually practised. The process as it has been usually carried out in the past (introduced by Schaffner) depends upon the action of sulphurous acid upon soda waste (alkali waste), and the process is so simple that for the present at least, other processes have but little chance of success.

Raynaud's process consists in acting upon a solution of sulphide of sodium with gaseous sulphurous acid. The sulphide of sodium is produced by roasting saltcake with small coal. Two furnaces are employed, and they are used alternately, so that the fused mass is allowed to cool, when it is broken up and dissolved.

Slacked lime is now added to the solution, in order to change any carbonate of soda into caustic soda, and the causticised solution is made to pass down a tower filled with coke, while the sulphurous acid gas passes upwards. The reaction which takes place is represented as follows:—

$$2\,Na_2S + 3\,SO_2 = 2\,Na_2S_2O_3 + S.$$

The sulphur combines with the sodium hydrate, in consequence of which the yield of hyposulphite is increased. The solution is concentrated in a series of three evaporating pans, in the first of which any acid is carefully neutralised with soda-ash. In the second pan the liquid is concentrated to 35° B. (1·321 sp. gr. or 64° Tw.), and in the third to 45° B. to 50° B. (1·454—1·532 sp. gr. or 91° Tw.—106 Tw.) After allowing some time to settle, the clear solution is run off into the crystallisers. We had this process put before us some time ago by the patentee's agent, and there is no doubt that in some situations, where both coal and saltcake are cheap, and where labour is plentiful and low in price, the process might hold its own.

## NOXIOUS VAPOURS IN MANCHESTER.

MR. JOHN HOLDEN, vice-president of the Manchester Society of Architects, delivered an address at the Association Hall, in this city, last week, under the auspices of the Noxious Vapours Abatement Association, on "The Pollution of Air as Affecting the Architect and his Work." Dr. H. Simpson, who presided, explained that that was one of a series of lectures to be delivered on the various aspects of the smoke and other noxious vapours nuisance which we in Manchester were unduly subject to. No one could walk through Albert-square and help noticing the effect of these vapours on our public buildings. The lecture that evening was from the architect's standpoint, but the next would be one which seemed almost absurd on the face of it—"The Smoke Nuisance as Affecting the Gardener." They all knew that the gardener was practically non-existent in Manchester, on account of the frightful pollution of the air. On the other hand, if there was a possibility of getting rid of the nuisance, it ought to be done, and then they might hope for some improvement in what was now called "unlovely Manchester." Mr. Holden, in his address, referred to the deleterious action of the polluted Manchester atmosphere on all stone and brick buildings, the effect of which, he said, seemed to be in both cases a gradual disintegration of its surface, reducing it to powder in many instances, and in others doing away with the materials altogether. It was admitted on all hands that it was not pleasant to contemplate grimy and partially decayed monumental work, but it was said it could not be helped. To this he replied that a great deal could be done to prevent it, and in proof of which they might look back at what had been done in Manchester, even in the recollection of the youngest present. Means must be found to prevent the deleterious vapours from escaping into the atmosphere, and to collect and utilise them, and also to prevent the volumes of smoke and soot and other products of combustion from being poured out of long chimneys, which of themselves disfigured any district. Science could do much, and pressure must be brought to bear upon those who had already, and were still, devoting a considerable portion of their time to the study of the question. To the working-classes this matter was of vital importance, as their limited means and their necessities rendered it impossible for them to escape those things which were gradually taking the energy out of them. Increased exertions should be made by all of them in this direction, and the authorities must be pressed as well as encouraged to take action against those persons who did not adopt the most recent improvements for preventing the mischief he complained of.

## THE RIO TINTO DIFFICULTY.

IT must not be taken for granted that the letter written to the press on the 6th inst., by Mr. Fennessy, the secretary of the Rio Tinto Company, will close this matter; although, after stating that fifteen of the rioters had been killed by the troops, he concludes as follows:—"Order seems now to be restored, and it was expected that the workmen would be enabled to resume their work in the morning."

On the contrary, we hear from Madrid that the Queen has inquired minutely into the facts, and has desired that all correspondence shall be read to her. Questions are being asked in Congress; the number of deaths, instead of 15, is stated to be 45, and fresh catastrophes are to be feared if the calcinations are allowed to continue their devastations to life and property in the neighbourhood of the mines. The interest in this subject is not confined to the Queen, but it is the absorbing topic in all classes of Madrid society.

At first it was thought that the disturbance was caused by the miners, but it now appears that it arose from the appearance of 4,000 to 5,000 "smoke agitators from the outside," as Mr. Fennessy styles them. Many of us are restive under the evils of London smoke, but in spite of its ill effects, even when combined with fog, we find that trees, turf, and some flowers spring into life, and afford some solace to town-sick souls, while the parks are not yet quite destitute of the pink and white of healthy childhood. Swansea, with scientifically-managed close calcinations, and tall stacks, has yet enough copper smoke to rob her undulating slopes of all their verdure. But owing to the calcination of the copper pyrites in the open air at Rio Tinto, Tharsis, and Saint Domingo, the country for miles round these mines is a desert and a desolation, no vegetation of any kind being able to make its appearance. Probably 1,000,000 tons of pyrites are now treated in this manner in these districts, and if so, 450,000 tons of sulphur are annually vomited into the air in the form of sulphurous acid. As with 5 per cent. of sulphuric acid, air becomes unfit for respiration and absolutely prejudicial to health, it follows that about 500,000,000 cubic feet of air become infected and unfit for breathing in a single year. So terrible is the condition of the atmosphere and of the vicinity of the mines, that it is stated that Englishmen will not remain there, although they receive double the wages they obtained in England.

With an atmosphere thus poisoned, with crops spoiled, and health impaired, the "smoke agitators" cannot fail to receive the sympathy of their fellow-countrymen, and it is not impossible that Congress may be compelled by this tension of public feeling to legislate, so as to greatly modify this widespread calamity.

If they do so, an entire change in the system of calcination would be the result, attended, probably, with a large additional cost for each ton of copper produced. Shareholders of Rio Tinto, in view of these facts, and of the inflated price of the shares, may question themselves whether it would not

be prudent to unload their present holdings at present prices to those sanguine Frenchmen, who can yet foresee copper at £100 per ton. We notice that already the market has lost much of its firmness. It will not be our fault if our readers have been caught napping, as we strongly advised them to sell their holdings when both copper and copper shares were at their highest prices.—*Investors' Guardian.*

## SOCIETY OF CHEMICAL INDUSTRY.

MANCHESTER SECTION.

THE monthly meeting of the Manchester section of this Society was held on Tuesday, the 7th instant, in the Victoria Hotel; Dr. Schunck in the chair. Mr. Rowland Williams read a paper on the "Adulteration of tallow with cottonseed oil," in which he said that during the past year he had examined a large number of samples specially for this adulterant, and had found it to be present in one or two cases. Mr. Williams stated that owing to the comparatively low price of cottonseed oil there was plenty of scope for profitable adulteration by dishonest tallow merchants. It was possible to add as much as 40 per cent. of cottonseed oil to tallow without the mixture differing appreciably in general appearance from ordinary tallow. In fact, the only means of detecting the fraud was by chemical analysis. A series of mixtures of tallow and cottonseed oil, containing from 5 to 40 per cent. of the latter, was prepared in Mr. Williams's laboratory. The melting points and saponification equivalents of these were nearly the same as those of pure tallow. He found, however, by determining the iodine absorptions of the various mixtures that it was easy to detect 5 per cent. of cottonseed oil, which is the smallest proportion likely to be introduced into tallow. Each percentage of iodine absorbed in excess of that required by genuine tallow indicated adulteration with about 1¼ per cent. of cottonseed oil. Mr. Williams therefore recommended, in addition to the usual tests, the application of Hübl's reagent in the analysis of tallow as being the most certain means of detecting adulteration. In the course of discussion, Mr. J. Carter Bell said that for the last year or two he had been working, not with tallow, but with lard. Vast quantities of lard came from America adulterated with cottonseed oil, and his attention was called to the adulteration by a firm of lard merchants, who asked him whether he could discover the method of adulteration. He found that chloride of sulphur had a most wonderful action upon cottonseed oil and other oils. He mixed 5 per cent. of cottonseed oil with the lard, and found that the temperature rose from 35 to 67, and the appearance of the lard was totally different with the 5 per cent. of cottonseed oil from that of pure lard. It became a dark brown, and in some cases nearly black. Chloride of sulphur was a most valuable reagent for detecting adulteration in pure lard and pure oils or fats. The rise of temperature indicated that something was wrong with the tallow or lard, but it did not tell what.

## Queries and Replies.

ARSENIC IN OIL OF VITRIOL.—The arsenic in oil of vitriol exists chiefly in the state of arsenious acid or common white arsenic, and depends upon the kind of pyrites used in the manufacture and several other things. Acid made from brimstone contains only traces; from Tharsis pyrites, about 0·13 per cent., while that made from Rio Tinto or Seville ore contains very much more.—J. B.

IRON IN OIL OF VITRIOL.—I have several times determined the amount of iron in the soluble form in rectified vitriol, and have never found more than 0·028 per cent. It seems to be precipitated during the concentration if any more than this is present in the weaker vitriol before concentration.—W. H. D.

CALAMINE.—Write to P. S. Reid, 20, John Street, Adelphi, London, or to W. J. Furnival, 101, Bucknall New Road, Hanley.

ASPHALTING.—Can any of your readers give me any practical method of asphalting, or direct me to any work where it is described.—CARBON.

MESSRS. BROOKE, SIMPSON, AND SPILLER LIMITED.—The directors of Brooke, Simpson, and Spiller Limited recommend a dividend at the rate of 6 per cent. per annum on the A shares.

## Trade Notes.

THE NEWCASTLE CHEMICAL WORKS CO. LIMITED.—The fifth ordinary annual meeting of this company will be held on Monday, the 20th inst., to receive the report of the directors and transact other business. We understand the net profit during the past year has been over £17,000. The directors will state that the plant erected for the production of caustic soda has given the best possible result, and that it is their intention to increase the manufacturing capacity to 450 tons weekly.

GERMAN PATENT LAW.—A petition has been presented to the Imperial Chancellor from the Union of Chemical Industries of Germany, in which the petitioners take up a position regarding the propositions of the Patent Commission, and again they request the passing of a law for the protection of the chemical industries, so that anyone who has patented an article in Germany can be protected against the importation of products made according to his process.—*Chemiker Zeitung.*

SAMPLE BOTTLES.—We have received a neatly lithographed sheet of sample bottles from our advertisers, Messrs. J. Dunlop, Mitchell and Co., with the intimation that they will be pleased to forward a copy to any of our readers interested in the same.

THE WATER QUESTION.—A correspondent in the *Manchester Examiner* suggests putting in every house a "simple meter or gauge" to measure the supply. Perhaps some of our correspondents may know of a cheap and "simple" instrument. We have been looking after such a thing for the past ten years.

LIVERPOOL WATER SUPPLY.—This time last year there were 3,700 millions of gallons in stock at Rivington. This year of even date there is only 1,015 millions. A small committee has the question in hand of seeking a temporary supply from other sources.

THE MERCHANDISE MARKS ACT.—The London Chamber of Commerce has held a meeting at the Cannon-street Hotel "to discuss the effects on British trade, as indicated by experiences up to the present of the Merchandise Marks Act, 1887, and the Custom's regulations in connection therewith." The speakers were certainly not unanimous in their opinions.

THE MERCHANDISE MARKS ACT.—A good deal of inconvenience is now felt by merchants in Liverpool owing to the operation of the new Merchandise Marks Act, and it appears that in many cases not only does the act inflict loss to the English merchant, but at the same time is protecting the marks of the foreign manufacturer. Whether this was the intention of the act or not is doubtful, but it is, nevertheless, the fact that the foreigner is protected by the English Government in a manner that he is not protected by his own country. At present there are quite a number of articles in the hands of the Customs authorities at Liverpool, which are being detained pending the receipt of the document showing the place where they were actually manufactured. In one case some spirits were being brought to Liverpool from Hamburg in transit for the west coast of Africa. The cases bear the mark of the French distiller, but coming from Hamburg they had been seized by the Customs, and the British merchant who is exporting them will have to prove the port of origin according to the marks before the goods will be released. Thus is the British Government protecting Frenchmen against the German, and there are said to be many cases of the kind. The British merchant could have sent the goods direct from Hamburg, and not been molested by the Merchandise Marks Act. This, however, would have been a clear case of giving to the foreigner what he intended to give to the British steamer. Nevertheless, in any future case, the goods will likely be sent from Hamburg direct to avoid any trouble from the new act.

MANCHESTER CHEMICAL CLUB.—The annual conversazione and cinderella of this club, to which the members of the Society of Chemical Industry are invited, will be held in the club rooms, Victoria Hotel, on Friday, February 24th. Mr. Thomas Harrison, F.C.S., has kindly consented to exhibit some of his well-known scientific apparatus during the course of the evening, and will also show some dissolving views, illustrating his recent tour in Spain.

THE PATENT FUEL TRADE.—During January last no less than 9,819 tons of patent fuel were shipped from Cardiff; 1,033 tons from Newport; and 12,554 tons from Swansea. This is equal to the consumption of 2,340 tons of coal-tar pitch.

FAILURE IN THE ALKALI TRADE.—On Friday, the 10th inst., a meeting was held of the creditors of Messrs. Lockwood and Leith, of Boundary Road Chemical Works and Parr Alkali Works, both in St. Helens. The liabilities are estimated at about £25,000. A committee was appointed. It is only a few months since Messrs. Lockwood and Leith took over the Parr Alkali Works, which had been standing idle for years, with the view of making caustic and bleaching powder; and as they are not members of the bleach association, perhaps this accounts for the bitter feeling displayed by some of the creditors who are members of that association. The feeling of the other creditors was to allow the debtors to continue business at the Parr works, which showed a prospect of profit.

NEW CHLORATE WORKS.—The Sutton Lodge Chemical Co., St. Helens, have now got their new chlorate plant in order, and are making at the rate of about 4 tons per week.

FOURNESS REGENERATIVE LAMP COMPANY LIMITED.—Registered on the 6th instant, with a capital of £50,000, in £5 shares, to purchase from Mrs. Elizabeth Fourness the business of gas-lamp manufacturer, plumber, and gasfitter, carried on at Pritchard-street, Manchester, and at Rue de Mât, Brussels, the purchase including several letters patent granted for gas apparatus and appliances. The subscribers are:—

| | Shares. |
|---|---|
| *J. R. Hampson, J.P., Old Trafford, Manchester..... | 100 |
| *J. Whitehead, Hale, Cheshire..... | 50 |
| *T. Hartley, Heaton Chapel, thread manufacturer... | 20 |
| *H. Luke, Sale, ironmonger ..... | 50 |
| W. Raby, 78, Cross-street, Manchester, valuer..... | 10 |
| *W. Jaffrey, 27, Booth-street, Manchester, plumber, | 100 |
| J. Parker, jun., Baguley, Cheshire, caterer ..... | 60 |

The number of directors is not to be less than four, nor more than seven; the first being the subscribers denoted by an asterisk and Mr. Peter Thompson; qualification, twenty shares. The company in general meeting will appoint renumeration.

ST. HELENS WATER SUPPLY.—At the last meeting of the St. Helens Town Council, the Water Engineer read the pumping returns as follows:—Eccleston Hill, total delivery of water for four weeks, 16,062,286 gallons; daily average 573,653 gallons; last month's daily average, 557,957 gallons. Whiston, total delivery for four weeks, 16,546,080 gallons; daily average, 590,931; last month's daily average, 589,005. Sutton-road delivery for four weeks, 17,252,800 gallons; daily average, 616,171 gallons; last month's daily average, 621,071 gallons. Knowsley, total delivery for four weeks, 17,008,900 gallons; daily average, 607,460; last month's daily average, 572,628. Eccleston old water, delivery for four weeks, 4,480,300; daily average, 160,011; last month's daily average, 133,760 gallons. During the month the total quantity of water delivered was 71,350,336 gallons, which had been distributed to an estimated population of 68,101 persons, being a total daily average of 2,548,126 gallons, against an average of 2,474,421 gallons in the corresponding period of last year. Rainfall for month ending January 31st, was ·93 inches; corresponding month last year, ·98 inches.

COST OF WORKING STEAMSHIPS.—The Quayside correspondent of the *Newcastle Chronicle* says:—The following statement of the cost and results of working in the case of a German steamship will interest many of our readers. The steamer is 602 tons net register, carries 1,200 tons, was built at the end of 1884, and cost £15,000. Last year, from February 2nd to December 31st, she carried 23 cargoes—North Sea and Baltic trades. The gross freights were £7,943. The payments out included:—

| | | | |
|---|---|---|---|
| Harbour Dues..... | £2,925 | Repairs, etc,..... | £365 |
| Coals..... | 791 | Dividend, 10 per cent.. | 1,500 |
| Wages and provisions | 1,031 | Reserve fund..... | 350 |
| Insurance on £12,500 | 794 | Cash in hand ..... | 187 |

To the reserve fund £450 was placed in 1886, and £350 last year. The dividends in 1885 and 1886 were at the rate of 11 per cent. These and the details above given in support of them may be safely compared with the working of British vessels in similar trades.

THE LONDON NITRATE COMPANY LIMITED.—An interim dividend at the rate of 8 per cent. per annum is announced by the London Nitrate Company Limited, for the half-year ended December 31, payable March 1.

THE SWAN ELECTRIC LIGHT COMPANY LIMITED.—The accounts of the Swan United Electric Light Company Limited, for the year ended September 30 last, show a credit of £7,554, which the directors propose should be applied in writing off the adverse balance of £5,834, leaving £1,720 to be carried forward.

BRUNNER, MOND, AND COMPANY LIMITED.—The report of the directors of Brunner, Mond, and Company Limited, to be submitted to the shareholders at the fourteenth half-yearly ordinary general meeting of the company, to be held at the Law Association Rooms, 14, Cook-street, Liverpool, on Monday, the 20th inst., states that the balance-sheet and profit and loss account show a balance to the credit of profit and loss account on the working of the half-year ended on the 31st December, 1887, of £89,111 19s. 10d., which, with the amount brought forward from the previous half-year, makes a total of £124,656 11s. 7d. The directors recommend the following dividends: On the preference capital, at 7 per cent. per annum, £11,043 4s. 7d.; on the ordinary capital, at 25 per cent. per annum, £70,625.

CLOSING OF WELSH IRONWORKS.—The Ruabon Ironworks of the New British Iron Company, the most extensive works in North Wales, have been closed in consequence of the continued depression in trade. The blast furnaces are extinguished, and the usual fourteen days' notice having expired, all the ironworkers are discharged. Many of the workmen are emigrating, while others are leaving North Wales for Lancashire, Yorkshire, Staffordshire and South Wales.

THE SWANSEA HARBOUR TRUST.—The Swansea Harbour trustees have appointed Mr. John Dixon, of Clifton, general superintendent of the docks and harbour at a salary of £800 a year. He was eleven years in the accountant's department of the North-Eastern Railway Company, and two years assistant to the superintendent of their coal shipping docks on the Tyne.

LOST THEIR RENT.—At the meeting of the River Tyne Commissioners at Newcastle-on-Tyne on Thursday, the 9th inst., it was reported that Sir W. G. Armstrong, Mitchell, and Co. had abandoned the project for constructing a factory on the Tyne at Elswick for the manufacture of quick-firing ammunition. The reason assigned was that the rent charged by the Commissioners was too high, being equivalent to £1,000 per annum. In face of the urgency with which the Government were pressing for the immediate execution of the order, the company did not feel justified in delaying the matter further, and had entered into arrangements for carrying out the work elsewhere.

THE CONSUMPTION OF MARGARINE.—So far, the results of the Margarine Act are not very encouraging to the gentlemen who supported it as a means of enhancing the value of real butter. There has been no rise in the price of the farm-produced article since the 1st of January, nor have any indications been furnished that the sale of margarine, as such, has prevented people from investing in it pretty much as usual. Before the Act came into operation, the import of foreign-made margarine to the Tyne amounted to about 2,500 packages per week, and we are notified that since the alteration of the law this rate of importation has been steadily maintained. In the first few weeks of the year we noticed, both in Newcastle and Sunderland, certain evasions of the law relating to the labelling of margarine, but from indications appearing in each case we concluded that the offence was unintentionally committed, and arose from an insufficient knowledge on the part of the shopkeepers of the requirements of the new Act. Since that time, the requisite label alterations have been made, and, so far as we can ascertain, the measures devised last session for the legal control of the trade are being given a fair trial. The result would seem to be that people are willing to buy margarine as such, and in this policy they are perhaps aided by recent improvements which have been made in the means of manufacturing the article. Margarine, as now displayed in the windows and on the counters of our shops, is as attractive in appearance as the best butter, and, eminent scientists having declared it to be perfectly wholesome, the public are likely to buy as much of it now as they did when it was proffered to them under a different name.

GERMANY AND THE SUGAR BOUNTIES.—Contrary to the assumption of various organs of the sugar industry in France, Belgium, and other countries, that the chief opposition was to be expected from Germany, the German Government is only desirous of formulating the Convention in such strict terms as to render it impossible for any of the contracting parties to adopt a system of veiled bounties.

A POWDER MILL BLOWN UP.—A terrific explosion occurred on Friday, the 10th instant, at a powder mill at Wapwallopen, Pennsylvania. Four persons were killed and forty injured—fourteen dangerously. Nearly every building in the town was wrecked or damaged, and the explosion was felt for twenty miles round.

# Market Reports.

## LIVERPOOL CHEMICAL MARKET.

Prices continue steady, although our market has been rather quiet during the past week. Soda ash, $\frac{3}{4}$d. Caustic soda: 60 per cent. white at £6; 60 per cent. cream, £6; 70 per cent. white, £7; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda: There is little improvement at 9s. 6d. to 10s. od.; cargoes, 3d. to 6d. lower. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; Green lump, £5. 7s. 6d.; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder, £7. 17s. 6d. for hardwood, and £7. 10s. for softwood. Saltcake, 21s. 6d. Bichromate of potash, 4$\frac{3}{4}$d. Bichromate of soda, 3$\frac{1}{4}$d. Carbonate of potash, £20. Chlorate of potash, 6$\frac{1}{2}$d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 26s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8$\frac{1}{2}$d. per lb. Arsenic, £11. Lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper somewhat easier at £21. 10s. to £22. Blanc fixe, £8. 10s. Manganese: Sulphate, £20; borate, best English make, 6d. Hydrate of alumina, £24 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) scarcer at 45s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 32s.; grey, 31s. Refined borax, £24 to £26. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Liquid ammonia ·880, 3$\frac{3}{4}$d.; ditto ·700, 3$\frac{1}{2}$d. Montreal potashes, 24s. Chloride of zinc (solid), £18. Hyposulphite of soda, dry and white, £5. 15s. Pearl ash, 40s. to 42s. 6d.

## THE LIVERPOOL MINERAL MARKET.

The improved tone reported last week has been maintained, but there is no advance yet to report in prices. Manganese: Importations having gone into consumption, and stocks remaining nominal, there is no change in prices. Magnesite (containing 98 per cent. of carbonate of magnesia): Large arrivals have come to hand, and prices are easy at 30s. to 35s. for raw lump. Bauxite (Irish Hill brand) is unaltered at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk: Arrivals have been increased somewhat; they have, however, nearly all gone into consumption; at the same time, stocks being reduced, prices are firmer at 80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonates) continues to be scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-stone: In fair demand; ground, £6 10s. to £7; specially selected lump, finest quality, £9 to £10 10s. Iron ore has much improved; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 21s. c.i.f. Emerystone rules steady, but prices are unchanged at £5 5s. to £5 15s. for lump; smalls, £5. Fluor and felspar quiet. Fullers' earth, 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and Tungstate of soda continue steady, and prices are unchanged. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore continues to improve in demand, and prices are stronger. Antimony ore, £10 to £15 for fair quality. Antimony metal from £37 10s. to £38. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar, 45s. for ground. Plumbago: Best Ceylon lump, £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. Ferromanganese: 80 % packed, £11 2s. 6d.; 70 % packed, £10; 60 % packed, £8 16s.; 50 % unpacked, £7 15s.; 40 % unpacked, £7 5s. Spiegel, 20 %, £4 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8 10s. Bitumen, finest picked, £35; original prime, £18 to £23.

## THE LIVERPOOL COLOUR MARKET.

Colours are unaltered. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French: J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White Lead, £21. 10s. to £22. Red Lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto, for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

Manufacturers, all round nearly, are complaining of slackness of demand, and there is hardly one article to be pointed at as forming the exception to the rule. Even in paraffins, the burning oil section of which has been a long time on "boom," there is a distinct withdrawal from late top prices—oil, for instance, standing at from 6d. to 6$\frac{1}{2}$d., according to brand and time conditions. The general alliance in the paraffin manufacture, including the making of candles, has been consummated, but the effect on the market has been very slight as yet. One cause of uncertainty is to be found in the attitude of the miners, which still continues threatening. The feeling in both bleaching powder and caustic soda is languid, and chlorate of potash has given way, returning to the value of three months ago. Bichromates are again neglected, as regards both home and continental demand, and sales last week bear no comparison with the brief spurt of the week before. Some Scotch paper mill owners have trouble before them in the action of certain municipal authorities *re* The Rivers Pollution Act, and a counter agitation is this week in progress by the mill employés, whose occupation is thereby menaced. General chemical values are as follows:—Soda crystals, 41s. net, Tyne; Alum, £5, less 2$\frac{1}{2}$ %, Glasgow; borax, English refined, £31, and boracic acid, £46 net, Glasgow; soda ash, 48/52°, 1d. less 5 %, Tyne; caustic soda, white 76°, £8. 2s. 6d., 70/72° £6. 17s. 6d. to £7, 60/62° £6, and cream 60/62° £5. 17s. 6d. to £6, less 2$\frac{1}{2}$ %, Liverpool; bicarbonate of soda, 5cwt. casks, £5. 15s., and 1cwt. casks, £6 net, Tyne; refined alkali, 48/52°, 1$\frac{1}{2}$d., less 2$\frac{1}{2}$ %, Tyne; saltcake, 21s. 6d., less 2$\frac{1}{2}$ %, f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 %, f.o.r. Glasgow; bichromate of potash, 4$\frac{1}{4}$d., and of soda, 3$\frac{3}{4}$d., less 5 % and 6 % to Scotch and English respectively; nitrate of soda, 9s. 6d.; chlorate of potash, 6d., less 5 % any port; sulphate of ammonia, £12. 2s. 6d., f.o.b. Leith; paraffin scale, 2$\frac{1}{4}$d. hard, soft 2d.; paraffin wax, 120° semi-refined, 2$\frac{11}{16}$d.; paraffin spirit, 6d.; burning oil, 6d. to 6$\frac{1}{2}$d.; lubricating oil, 885°, £6 10s. to £7; sulphate of copper, £23. Glasgow imports have included 2,400 tons iron ore and 2,230 pyrites of copper. Greenock: 25,723 bags and 11,322 baskets of sugar.

## MISCELLANEOUS CHEMICAL MARKET.

There are as yet no definite indications of improvement in trade, and complaints are very general. Prices all round are exceedingly low, and orders can as a rule be placed in buyers' favour. In the alkali trade the prices of last week are maintained: Bleaching powder is in good demand, at £7. 10s. (rails). Chlorate of potash is a shade weaker, and in quantity can be bought at 6d. With increased prices for copper, sulphate has hardened a little during the week. Flake litharge and lead salts are upon the whole firm, but prices have in one or two instances been slightly reduced in order to make business. Acetates of lime are unchanged in value, but quiet. Ammonia products all round are at low values. Muriate and salammoniac are maintaining prices, but demand is below the average. Sulphate is again a shade lower in price. Coal-tar products are in moderately good demand, and prices all round are well maintained.

## THE ALKALI TRADE.

There is very little change to report in this market: sodas and all soda products continue to be inanimate. Saltcake, 21s., and alkali (both caustic and carbonate) at prices which may be found in our prices current. There is a fair demand for bleaching powder, and this is the only product which is being inquired for. Much energy is being displayed in the Newcastle district in the high strength caustic soda which is being manufactured there, and it is prognosticated that the Newcastle Chemical Co. are about to enormously extend their manufacture of this article. As may be found under the heading of "trade notes," an addition has been made to the output of chlorate of potash, the works being situated at St. Helens.

## THE TAR PRODUCTS MARKET.

Dulness prevails in all markets for benzol, and though prices are quoted, yet no business is transacted: 90's benzol, although mentioned in our prices current at 3s. 9d., can only be said to be value for 3s. 6d., and 50/90's benzol 2s. 7d. All other tar products are in fair demand, and at firm prices. Crude carbolic acid, 4s.; anthracene 1s. for B quality and rising, with 1s. 3d. to 1s. 4d. for A quality. Pitch is in better demand, but the old rates are ruling, except in one or two instances, where a slightly higher price has been obtained.

## THE SULPHATE OF AMMONIA MARKET.

The market continues dull, but few continental orders having come forward, and although prices have not declined, there seems no immediate chance of their enhancement. Hull prices may be taken as £12. 3s. 9d. to £12. 5s. 0d., and Leith and Liverpool at the former figure. Beckton price is £12. 12s. 6d., but outside London makes have been sold at £12. 10s. The present severe weather will have much to do with the values of spot delivery for sulphate, though there is no doubt in a few weeks' time, if the weather is suitable, prices will rally. Leith continues to ship a much larger proportion than other ports.

# New Companies.

Australasian Gas Association Limited.—Capital, £250,000 in £10 shares.

Bratsberg Copper Company Limited.—Capital, £120,000 in £1 shares.

Eclipse Electric Lighting Syndicate.—Capital, £20,000 in £1 shares.

Electric Traction Company Limited.—Capital, £30,000 in £10 shares.

Fourness Regenerative Lamp Company Limited.—Capital, £50,000 in £5 shares.

Marsh Light Company Limited.—Capital, £5,000 in £1 shares.

Netherlands Farmers' Manure Supply Association Limited.—Capital £5,000 in £5 shares.

Tower Fibre Dressing Company Limited.—Capital, £2,000 in £1 shares.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

Atherton & Co., Wigan, Drysalters.

Pullan, Tuke & Co., Leeds, engineers.

Sowerby & Co., Leamington, glass manufacturers, as far as regards H. H. Pitt.

Wilson & Shaw, Attercliffe, Sheffield, engineers.

J. Gaskell & E. B. Petrie, under the style of The Gaskell Antifriction Slide Valve Co., Manchester, engineers.

Beharell & Son, Byng-street and Tobago-street, Millwall, paint makers.

Bentley & Price, Birmingham, engineers.

Hulme & Brownsword, Manchester, oil importers and refiners.

A. Eyton, R. J. Sisson, P. H. Chambers, R. Anderson, T. W. Brown, R. Roberts, & W. H. Ashwin, Mostyn, under the style of the Eyton Copper Co., copper extractors.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Bond, John, & Bond, Claire Phillipine, trading as C. P. Bond & Co., Birmingham, brickmakers.

#### Adjudications.

Blackmore, William Henry, Bermondsey-street, Southwark, and Endwell-road, Brockley, London, tanner.

Smirt, George Edward, New Park-road, Brixton-hill, London, oil and colourman.

Bench, Daniel, Bransgore, Christchurch, Hampshire, brickmaker.

#### First Meetings and Public Examinations.

Faulkner, John, Manchester, electric engineer. Feb. 20, Official Receiver's Offices, Manchester. Feb. 22, Court House, Manchester.

Osbourn, James Henry, Kingston-upon-Hull, engineer and contractor. Feb. 17, Official Receiver's Office, Hull. March 5, Court House, Hull.

Pickover, Johnson, & Carruthers, David, trading as Pickover & Co., Burnley, drysalters. Feb. 20, Exchange Hotel, Burnley. Feb. 23, Court House, Burnley.

Doughty, William Hall, trading as the Yorkshire Paint and Colour Co., Kingston-upon-Hull, colour manufacturer. Feb. 21, Official Receiver's Office, Hull. March 5, Court House, Hull.

#### Notices of Dividends.

Fitzgibbon, Gerald, trading as Gibbon & Co., late of Eastcheap, London, and Liversedge, Yorkshire, and Headingley, near Leeds, dyewood and drysaltery broker. First dividend of 2s., Feb. 23, 71, Eastcheap, London, E.C.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

Automatic Extinguisher for Lamps. H. Wakefield. 1602. Feb. 3.
Fire-Places. W. Foulis. 1612. Feb. 3.
Boilers for Heating Water. W. Foulis. 1613. Feb 3.
Refining Hydrocarbon Products. H. J. Fenner, F. Fenner, and G. H. Fenner. 1617. Feb. 3.
Improvements in Stills. R. P. Preston and R. W. Preston. 1622. Feb. 3.
Improved Mining Cartridge. R. H. Edmundson and J. Smethurst. 1633. Feb. 3.
Weighing Machines. H. Allchin. 1638. Feb. 3.
Electrical Lamps. W. Davis and T. J. Turner. 1649. Feb. 3.
Preserving Eggs. H. H. Lake. 1653. Feb. 3.
Kilns for Drying Grain. F. Strachan. 1662. Feb. 3.
Obtaining Gaseous Hydrochloric Acid. J. Beveridge. 1665. Feb. 4.
Bone Mills. F. Hawke. 1672. Feb. 4.
Pumping Engines. J. W. Melling. 1676. Feb. 4.
Portland Cement. J. C. J. Smith. 1689. Feb. 4.
Manufacture of Phosphorus. A. Nicolle. 1693. Feb. 4.
Manufacture of Antiseptics. W. Black and W. L. Rennoldson. 1696. Feb. 4.
Compound Gas Engine. W. J. Crossley. 1705. Feb. 4.
Compound Gas or Oil Engine. F. W. Crossley. 1706. Feb. 4.
Recovering Zinc and Alkali from Batteries. H. A. Fergusson. 1707. Feb. 4.
Steam Boiler Furnaces. D. Justice. 1712. Feb. 4.
Extracting Metals. A. French and R. Munro. 1723. Feb. 6.
Disinfecting Tanks. N. G. Beck. 1726. Feb. 6.
Evaporating Saccharine Liquids. A. Chapman. 1752. Feb. 6.
Ovens for Burning Bricks. R. Stanley. 1764. Feb. 6.
Cutting Gauge Glasses. A. Heggie and J. Raven. 1773. Feb. 6.
Hydrocarbon Motors. E. Butler. 1780. Feb. 6.
Hydrocarbon Motors. E. Butler. 1781. Feb. 6.
Welding Plates and Tubes. W. S. Sutherland. 1788. Feb. 7.
Drying, Mordanting, and Ageing Fibrous Materials. D. Johnson. 1816. Feb 7.
Tanning by Electricity. G. W. Rhodes. 1818. Feb. 7.
Improvement in T Squares. E. Lucas. 1819. Feb. 7.
Clarifying Beer. E. R. Moritz. 1833. Feb. 7.
Purifying and Filtering Water. O. H. Jewell. 1836. Feb. 7.
Production of Oxygen and Nitrogen from Air. E. B. Ellice-Clark and L. Chapman. 1844. Feb. 7.
Treating Palm Oil. A. Wilkinson. 1846. Feb. 7.
Removing Machine-made Ice from Vessels. G. Molyneux. 1853. Feb. 8.
Utilisation of Slate Waste. J. T. Welch. 1862. Feb. 8.
Manufacture of Carbons. A. Tack. 1869. Feb. 8.
Extinguisher for Oil Lamps. J. Shepherd and T. Shepherd. 1870. Feb. 8.
Furnaces. J. Beveridge. 1871. Feb. 8.
Dynamo-Electric Machines. G. Hookham and R. H. Housman. 1875. Feb. 8.
Separation of Liquids from Solids. R. Muirhead. 1884. Feb. 8.
Manufacture of Bronze. W. H. Beck. 1886. Feb. 8.
Hydro-carbon Burners. W. T. B. M. Mainwaring. 1892. Feb. 8.
Dry Gas Meters. J. L. Cloudsley. 1899. Feb. 8.
Extraction of Metals by Amalgamation. H. Moon. 1904. Feb. 8.
An Improved Motor. J. Barnier. 1912. Feb. 8.
Dyeing Furs or Skins.—(Complete specification). A. Herrmann, M. Herrmann, and E. Herrmann. 1913. Feb. 8.
Separating Gold from its Ores. J. Hornsby and G. E. Coupe. 1914. Feb. 8.
Caloric Engines. W. A. G. Schönheyder. 1916. Feb. 8.
Filter Presses. L. Gismondi. 1921. Feb. 8.
Cream Separators. C. F. Larsen. 1922. Feb. 8.
Filter Presses. J. A. Drake and R. Muirhead. 1923. Feb. 8.
Manganese Ore, Shipment of. H. Morris. 1939. Feb. 9.
Filters. W. J. Turner. 1942. Feb. 9.
A Beer Rouser. E. McCann and C. B. Edmondson. 1946. Feb. 9.
Boiling Water. H. E. Philipson. 1948. Feb. 9.
Dyeing Hanks of Yarn. S. Spencer. 1954. Feb. 9.
Secondary Batteries. W. Tilley. Feb. 9.
Saccharine Beverages. A. Manbré. 1977. Feb. 9.
Cement. W. Joy. 1978. Feb. 9.
Cement. G. W. Sharpe and F. W. Turner. 1979. Feb. 9.
Lime and Cement. M. H. Heys. 1980. Feb. 9.
Electro-Motor. T. Parker. 1981. Feb. 9.
Mining Cartridges. C. Libbrecht. 1984. Feb. 9.
Woodbury Type Printing. G. C. Whitfield. 1985. Feb. 9.
Machines for Testing Lubricants. A. J. van Alstein. 1986. Feb. 9.
Nickel Electrotypes. T. L. M. Hare and L. Boudreaux. 1991. Feb. 9.
Extinguisher for Oil Lamps. S. R. Williams. 1995. Feb. 9.

# PRICES CURRENT.

[THURSDAY, Feb. 16, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids :—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 9 | 3 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3¾ |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 7 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) | ,, | 1 | 6 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 7 |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 12 | 6 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3¼ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 0 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 10 | 0 |
| ,, ,, (grey), Hull | ,, | 12 | 5 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8½ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 15 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 10 | 0 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes :—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products :—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 9 |
| ,, 50/90 ,, | ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 3 |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 4 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 78 | 0 | 0 |
| ,, Sulphate | ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 70 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 16 | 15 | 0 |
| ,, Litharge Flake, ex ship | ,, | 16 | 12 | 6 |
| ,, Acetate (white) | ,, | 27 | 15 | 0 |
| ,, ,, (brown) | ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 0 | 0 |
| ,, Nitrate | ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 15 | 0 |
| ,, ,, (grey) | ,, | 13 | 17 | 6 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 18 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent | ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 9 |
| **Oils :—** | | | | |
| Castor | per cwt. | 1 | 4 | 6 |
| Cotton-seed | per ton | 21 | 10 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 7 |
| ,, American | ,, | 0 | 0 | 7½ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 6 |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 0 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % | per ton | 9 | 15 | 0 |
| ,, Muriate, 80 % | ,, | 8 | 5 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 7 11/16 |
| ,, Nitrate | ,, | 0 | 2 | 7½ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 4 | 0 | 0 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) | ,, | 2 | 6 | 3 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 20 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 31 | 0 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 8 | 10 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 12 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 17 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 18 | 9 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 16 | 3 |
| ,, Bicarbonate | ,, | 5 | 10 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 6 |
| ,, Nitrite, 98% | per ton | 29 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5¾ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 12 | 6 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 7 | 6 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 13 | 10½ |
| ,, Cane | ,, | 0 | 18 | 3 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 8 |
| ,, Barium | ,, | 0 | 0 | 5½ |
| ,, Copper (pure) | ,, | 0 | 1 | 2 |
| Sulphur (Flowers) | per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 0 | 0 |
| Tallow | ,, | 26 | 15 | 0 |
| Tin (metal) | ,, | 160 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) | per ton | 19 | 10 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 15 | 0 |

# ıe Chemical Trade Journal,

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**SATURDAY, February 25, 1888.**


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## Notices.

ommunications for the *Chemical Trade Journal* should ressed, and Cheques and Post Office Orders made e to—

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is one of the special features of the *Chemical Trade* to give the earliest information respecting new es, improvements, inventions, etc., bearing upon the al and allied industries, or which may be of interest eaders, the Editor invites particulars of such—when ing order—from the originators; and if the subject is of sufficient importance, an expert will visit and pon the same in the columns of the *Journal*. There e required for visits of this kind.

shall esteem it a favour if any of our readers, in inquiries of, or opening accounts with advertisers in er, will kindly mention the *Chemical Trade Journal* as ce of their information.

rtisements intended for insertion in the current issue, should reach the office by **Wednesday morning** atest.

## Advertisements.

l, prepaid Advertisements, of Situations Wanted or Premises on Sale or To be Let, Miscellaneous Wants, ecific Articles for Sale by Private Contract, are inser- he *Chemical Trade Journal* at a charge of One Penny d for each insertion—minimum charge One Shilling.

e Advertisements, Announcements in the Directory s, and all Advertisements not prepaid, are charged at iff rates, which will be forwarded on application.

## SPECIAL NOTICE.

IT is our intention at an early date to introduce a new feature in the pages of the *Chemical Trade Journal*—one that we feel sure will commend itself to our numerous circle of readers, seeing that nothing of the kind has ever been attempted before in connection with the Chemical and Allied Industries.

We propose to issue a weekly summary of the chemicals and articles of a kindred nature exported from and imported to the principal seaports in the United Kingdom, commencing in the first instance with the five following ports, viz., London, Liverpool, Glasgow, Hull (with the Humber ports), and Newcastle-on-Tyne.

Those of our readers who are acquainted with the sources of information available for the purpose, will not need to be told of the vast amount of labour, not to mention expense, involved in the proposed compilation, but believing as we do that the information will be of the greatest practical value to our subscribers, we shall spare no pains in compiling and presenting in our pages a handy and reliable record from week to week.

Any suggestions that our subscribers may have to offer in connection with this matter will be gladly received and duly considered.

## THE APPROACHING WATER FAMINE.

WHEN Noah preached the coming of a universal deluge but very few paid any heed to his ministrations, may be for the reason that there were at the time no visible signs of the approaching pluvial downpour,—and so on from time to time whenever meteorologists have discovered, or fancy they have discovered a break in the sequence of things natural, the world has turned a deaf ear to their utterances, and has gone on living and working as if man was never expected to dive into these secrets of Nature, and could never make any observations of any use in prognosticating the character of the weather in the near future.

Whether we have arrived at that state of knowledge when observations of the meteorological conditions of the past are to guide us in the future it is hard to say; but when men who have devoted their whole lives to the subject utter a note of warning it behoves us not to stave off the evil day too long. Last year, so far as water supply was concerned, was certainly a year of famine, and the present state of some of our principal sources of supply are such as to cause the gravest anxiety. Liverpool is now in great straits, and the public supply of water is at the present time curtailed, and when we consider that all has been done there that is practically possible to prevent waste, the occurrence of a drought this spring and summer would be no doubt attended with very serious consequences. And Manchester, again, is in nearly as bad a position as Liverpool. The Mayor, at the last meeting of the Council stated that there was only 107 days' supply, and during a discussion that took place on this subject, it was stated that practically there was no available source to open up other than that which was at present being relied on. Pumping from wells seemed to the Mayor out of the question, as he stated the committee could save more water in one week by discontinuing the night supply than by pumping at Moston for one month.

We do not think the position taken up by the chief magistrate respecting the cost of pumping machinery a good one, as the cost of pumping actually accomplished in America does not demand a very serious outlay. The water supply to a community should first of

all be given to resident citizens for household purposes. Most, if not all local governing bodies have the power to close wells suspected of insanitary influences, and they have exercised these powers so well that wherever a local authority has the water supply in its own hands private wells for drinking purposes have been practically abolished. For manufacturing purposes water of a less degree of purity may be in every way satisfactory, but while it can be purchased off the local authority at a less cost than it can be pumped, there is not much chance of the manufacturer putting down pumping machinery of his own.

In times of plenty, when even a large waste is but of little consequence to the community, householders will not grudge the manufacturer a good supply, but on sanitary grounds it is imperative that the sewers shall be regularly flushed, and that a sufficient household supply be given to prevent the spread of disease. This may be a trying year—with small-pox, scarlatina, and other diseases around us—another year of short supply such as last may play havoc in our larger towns and cities. Now is the time to be up and stirring, there are many manufacturers who will not agree to any reduction in their "compensation" water although they have been immensely benefited by the existence of the impounding reservoirs. This is amply proved by the fact that the proposed conference on the subject last year met to find an empty meeting, a few millowners only being represented by their solicitors. The fact that nothing was done leads one to suppose that manufacturing water must be supplied, and if any remains, that required for sanitary and household purposes is to be doled out so long as it lasts to the many thousand recipients. If this be the state of the law it is a very serious matter.

But we must now take the subject from a manufacturer's point of view, What would happen if the compensation water did not fall from the clouds? Doubtless many of the bleach and dye and calico printworks, to say nothing of the paper mills, would come to a full stop. This happened in many quarters last year, and is quite as likely to happen again. Is it not in the manufacturer's interest then to consider the question of pumping for himself? He knows to a nicety the quantity of water he requires, and therefore a description of the Worthington pumping engine and the cost of raising water by its aid, which will be given in our next week's issue, deserves a very careful study.

But our readers may ask What are the grounds for believing in the approach of a water famine of any magnitude? The reply may be found in several letters lately sent to the *Times* newspaper.

Sir John Lawes, though in his concluding remarks he disclaims all idea of being considered a weather prophet, states that even if we have an average rainfall, the facts he has brought forward "certainly point to a reduced supply of water during the coming summer," and he has "already told the man who grows watercresses in the river Ver, that it will probably be dry next summer." Although the warning has been addressed to a watercress grower at Rothamsted, we may all take a lesson by it, and the following cutting from Sir John Lawes' letter may serve to show the *raison d'être* of this article:—

"The average amount of rainfall at Rothamsted is 29in. per annum, and the average amount of rain passing through 60in. of soil is 13½in.; of this, nearly 10in. passes between September and March. From September to the time I am writing, which is approaching the end of January, only a little more than 4½in. has passed through my 60in. gauge, and although we have February before us, to which our ancestors added the term "Fill dyke," we must not rely too much upon their authority, as our rain gauges tell us that the average rainfall for this month is, with one exception, the lowest of any month in the year. Therefore, unless we have a great excess of rain in February, there will, in this district at all events, be a very short supply of water during the ensuing summer."

Mr. G. J. Symons, F.R.S., emphasises the letter of Sir John Lawes, and winds up by saying—

"January has apparently brought little consolation. In London we have had 0·90in. instead of 2·35in., or much less than half our average, and from the returns for the *Meteorological Magazine* yet received I find that the fall generally over England has been much below the average, and in several districts not one quarter of the average."

Manchester requires 20,000,000 gallons per day and gives 13,500,000 gallons of compensation water; much of the twenty millions actually goes for manufacturing purposes: in the case of a failure of the water supply great inconvenience would be caused to manufacturers dependent upon this this source only. We would therefore call upon them to remember the old Chinese proverb, and to "Dig the well before you are thirsty."

## THE ADULTERATION OF LARD.

BY J. CARTER BELL, A.R.S.M.

SOME time ago I had a number of American lards sent to me for examination, being suspected of adulteration. With such a substance it was of course very difficult to specify what the genuine article was mixed with; but after many trials I managed to discover that in the instance before me cottonseed oil was the adulterant. After trying many processes and failing with them all, I hit upon the use of chloride of sulphur as being a reagent likely to be of some use in the inquiry. It is well known that chloride of sulphur (the $S_2 Cl_2$) when mixed with a drying oil gelatinises it, and the product so obtained is sold under the name of indiarubber substitute. This "substitute" is insoluble in petroleum "benzoline," and these reactions seemed to indicate to me a process for the separation, or at least the detection of cotton-seed oil and other oils of a similar nature, in the presence of such fats as lard, tallow, etc.

In order to see how oils and fats would behave under the influence of this reagent, I first mixed them in various proportions, and finally discovered that 5 c.c. of the lard melted at 35° C., and mixed with 1 c.c. of benzoline, and also 1 c.c. of the chloride of sulphur, and well stirred, leaving the mixture at rest for twelve hours was all that was necessary.

Pure lard remained unaltered by the foregoing treatment, and after standing twelve hours the mixture is soluble in benzoline. On the contrary, other oils and fats were variously affected, as will be seen by the following table which shows the rise of temperature on the addition of the chloride of sulphur, and the behaviour of the mixture at the time:—

| Description of oil or fat. | Rise of temp. ° C. | Colour of mixture | Physical condition. |
|---|---|---|---|
| Cocoanut ..... | 3° | Light amber..... | Liquid. |
| Pale rape ..... | 40° | Dark ,, ..... | Solid. |
| Palm ..... | 31° | ,, red brown ... | Liquid. |
| Castor ..... | 51° | Very dark ,, ... | Solid. |
| Linseed ..... | 61° | Dark ,, ... | ,, |
| Cottonseed ..... | 57° | Light ,, ... | Viscid. |
| Sesame ..... | 59° | Red ,, ... | Solid. |
| Walnut ..... | 16° | Light amber..... | Liquid. |
| Almond ..... | 12° | ,, ,, ..... | ,, |
| Poppy ..... | 66° | Dark ,, ..... | Solid. |
| Sperm ..... | 10° | Light ,, ..... | Liquid. |
| Olive ..... | 10° | ,, ,, ..... | ,, |
| Theobroma..... | 7° | Dark ,, ..... | ,, |
| Lard..... | 20° | Light ,, ..... | ,, |
| Butterine..... | 10° | ,, ,, ..... | ,, |

After standing twelve hours, the following table shows the change which had taken place and the behaviour of the mixture with benzoline:—

| Description. | Physical state. | Behaviour with Benzoline. |
|---|---|---|
| Palm ..... | Viscid ..... | Soluble. |
| Almond ..... | Yellow, transparent, hard ... | Not dissolved. |
| Walnut ..... | " " | " |
| Theobroma. | Liquid ..... | Easily soluble. |
| Sperm ..... | Viscid ..... | " |
| Olive ..... | Transparent, hard ..... | Not dissolved. |
| Cottonseed .. | Brown, hard mass..... | " |
| Cocoa ..... | Very liquid ..... | Easily soluble. |
| Lard ..... | Liquid ..... | " |

A suspected sample of lard or tallow may be treated as before described, the rise in temperature noted, and then left at rest at the ordinary temperature for twelve hours. If any cottonseed oil is present there will be a glue-like formation, which will be insoluble in benzoline.

All the details of the operation before mentioned must be strictly followed, as by particular methods of treatment even pure lard may be rendered insoluble in benzoline after treatment with chloride of sulphur. It is very doubtful whether so small a quantity of cottonseed oil as 5 per cent. can be detected in lard or tallow by this means, as after treatment and standing for twenty-four hours, the mixture is dissolved by benzoline; but there is the rise of temperature to guide the operator, which in a mixture of 5 per cent. cottonseed oil and 95 per cent. of pure lard, made in the laboratory, amounted to 32° C.

In a trial—side by side—of pure lard and a sample of adulterated with 10 per cent. of cottonseed oil, the former easily dissolved in benzoline after having remained at rest for twelve hours, while the latter proved insoluble. I do not give this method as an infallible guide for the detection of *cottonseed oil* in lard or tallow, but as a rough method for preliminary examination, in order to see whether the sample requires a further examination. Adulterated lards do not always show even such a rise of temperature with chloride of sulphur as pure lard, but of course this shows the sample under examination to be abnormal.

## POLLUTION OF THE WATER OF LEITH.

A MASS meeting of the employés of the various paper mills on the Water of Leith was held on Saturday at Juniper Green, near Edinburgh. The paper mills on the water are Balerno Bank, Kinleith, Woodhall, Mossy Mill, West Mill, Spylaw, Kate's Mill, and Slateford Mill, and all of these were represented at the meeting, which was held in the Free Church Hall. About 400 employés were present. Mr. Herd, of Kinleith Mill, presided, and the proceedings were carried through with a great deal of enthusiasm, the various resolutions being unanimously agreed to. After some preliminary remarks from the chairman in reference to the establishment of papermaking as an industry on the Water of Leith about a hundred years since, and the extension of the industry to its present important position, the first resolution was moved by Mr. McKenzie, of Kinleith. The resolution was a protest against the action taken by the Town Councils of Edinburgh and Leith against the paper-mill owners on the Water of Leith in the shape of interdicts to prevent the pollution of the stream by the paper mills, and which interference was held to be quite unwarranted, the pollution complained of being saturated with chloride of lime, a powerful disinfectant that purified the river by its wholesome properties. Mr. Allan Finlay, of Mossy Mill, briefly seconded the resolution, which was spoken to by Mr. Mowat, of Kate's Mill, at considerable length. Mr. Mowat stated that the paper mill refuse was not only harmless to health, but disinfected the sewerage of the various villages run into the stream, as well as the sewage from Edinburgh which found its way into the Water of Leith. The second motion put to the meeting was a request that the Town Councils of Edinburgh and Leith should reconsider the course they had adopted, which would involve heavy outlay to the paper mill owners, serious interference with the business of the mills, and the possible shutting up of some of these altogether. Mr. Sharp moved the resolution, and remarked that Edinburgh families chose for their summer residence houses upon the Water of Leith, and that this could not happen if the river was polluted to an extent dangerous to health. Mr. James Stewart, West Mill, spoke in defence of the healthiness of paper mills and the disinfecting agencies discharged into the river by paper mills. He mentioned that cows and horses drank the water said to be dangerously polluted, and remarked that those employed in paper mills enjoyed a high average of good health. Insurance and friendly societies were of that opinion. A memorial was moved, seconded, and adopted by the meeting, to be addressed to Mr. Gladstone, M.P. for Midlothian, requesting his assistance towards getting a private or public inquiry into the working of the River Pollution and Smoke Nuisance Acts, with a view towards obtaining a Royal Commission, on the evidence of which these Acts might be altered and amended, so as to relieve paper making and other industries from the oppression the present working of these Acts enforces. This memorial having been supported, the usual votes closed the proceedings. A permanent committee was formed out of the meeting to watch over the interests of the paper mills on the Water of Leith.

## Official Memoranda.

FROM THE BOARD OF TRADE JOURNAL.

INCREASE OF IMPORT DUTY ON BURNING OILS IN RUSSIA.—Sir R. B. D. Morier, Her Majesty's Ambassador at St. Petersburg, notifies that an excise duty having been imposed on mineral burning oils, the Customs duty on these oils has been raised from 70 copecks to 1 rouble gold, per poud, that is, from 6s. 10d. to 9s. 9d. per cwt., the poud being 36lb. avoirdupois, and the gold rouble 3s. 2d. The duty on machine oils remains unchanged.

SWITZERLAND CUSTOMS TARIFF.—Phenic acid or creosote acid of coal-tar, will be charged a duty of from one franc per quintal; the quintal being 220·41lb. avoirdupois, and the franc $9\frac{6}{10}$d.

ITALIAN CUSTOMS TARIFF.—Mixtures of acetic acid and sulphuric acids artificially coloured will pay a duty of 10 lire per 100 kilos, the lire being equal to $9\frac{6}{10}$d. Varnish, composed of oxide of iron, spirits, essential oil, and resin will pay a duty of 30 lire per 100 kilos. Black, to be used as a substitute for lampblack, duty 5 lire per 100 kilos. Earth containing oxide of iron of no other use than for smelting admitted duty free. Wedge-shaped bricks, duty free. Resin pitch will pay a duty of 50 centesimi per 100 kilos. Unrefined paraffin, duty 8 lire per 100 kilos. Ashes containing phosphate of lime intended as manure, duty free.

DUTIABLE ARTICLES IN THE UNITED STATES.—An order has been recently issued by the Post-office Department of the United States relative to the treatment of dutiable articles received in the mails from foreign countries. Where the Postmaster has reason to believe packages to contain dutiable articles, they may be detained at the post-office, notice being sent simultaneously to the addressee and the Customs Officer, and the packages are to be opened in the presence of the Customs Officer.

AMERICAN CUSTOMS DECISION.—Yellow prussiate of soda, which bears a strong resemblance to yellow prussiate of potash, is held to be dutiable at the rate of 5 cents. per lb. The so-called distilled verdigris, which upon investigation has been found to consist of an article known as acetate of copper, is held to be dutiable at the rate of 25% *ad valorem*. The substance styled "black salts," which upon investigation was found not to be the black salts specified in the free list, viz., "aniline black salts," but a species of crude potash, has been held to be dutiable at the rate of 20% *ad valorem*. Articles, such as blow-pipes, forceps, etc., for use in scientific or educational purposes, are entitled to free entry. The substance claimed by the importer to be iron ore, but which was intended for paint purposes, is held to be dutiable at the rate of 25% *ad valorem*. Certain emery rollers, which upon investigation were found to be made in part of emery only, are held to be dutiable at the rate of 20% *ad valorem*.

ARGENTINE REPUBLIC CUSTOMS LAW.—Machinery for preserving meat by freezing, or other modern system, are exempted from duty by special national laws, as also specifics for curing sheep, staves and coverings for preserved meats, and dynamite.

WÜRTTEMBERG NEWS.—As an evidence of the encouragement accorded by the State to industry, it may be mentioned that the Württemberg Parliament has voted £111,750 for a new building to accommodate the Museum of National Industry. Prizes are now offered for competition amongst German architects for the best design. These designs are to provide every accommodation suggested by experience, including yards for exhibitions. The new building is expected to surpass all such hitherto existing.

Canada.—For the purpose of rectifying oil of vitriol, His Excellency, the Governor-General, in Council, has been pleased to order that retorts, pans, condensers, tubing and piping made of platinum shall be admitted into Canada free of duty.

Indian Import Duty on Salt.—A communication has been received from the India Office to the effect that by a notification issued on January 19th the duty on salt imported into India was raised in Burmah from 3 annas to 1 rupee, and in all other parts from 2 rupees to 2·8 rupees per maund of 82⅔lb. avoirdupois.

Swedish Measures for Development of Export Trade.—In their last session, the Swedish Rigsdag placed at the disposal of the Government a sum of 20,000 kröner, to be employed in promoting the export to foreign countries of industrial products of Sweden, and it was also decided on the 13th January to recommend that 5,000 kröner should be devoted to the establishment of an agency in Germany to promote the sale of Swedish fish, and if possible other industrial products, and that 15,000 kröner should be employed in despatching a travelling agent to India, China, and Australia, charged with the commission of promoting the sale of Swedish goods.

Production of Sulphur in Sicily.—The quantity produced from 1831 to 1885 is said to be 8,353,091 tons. When it is considered that to obtain this quantity about 15,000,000 tons were turned over (as generally a third is lost in the treatment), there appears still available at least 50,000,000 tons, and supposing that the average production for the future should be maintained at about the same proportion as in past years, the Sicilian mines may continue to be worked for another century.

Manganese Ore.—Manganese is now being mined in Gosalpur, in the Jabalpur District of the Central Provinces of India. Samples have been sent to experts in England, and the results of the analyses show that the ore is rich in manganese, and is considered well-adapted for the manufacture of chlorine or ferromanganese; but for the latter industry it would require to be mixed with purer ores, in consequence of the large quantity of phosphorus it contains.

Native Industry in Roumania.—The Roumanian laws have now been amended in order to encourage native industry, and special facilities will be given to capitalists investing at least 50,000 francs in any business requiring the employment of 25 workmen daily; two-thirds of the workmen, however, must be Roumanians. Some of the privileges offered are freedom from taxation for a period of fifteen years; admission free of duty of all machinery imported from abroad for use in the factory, and admission duty free of raw materials, which cannot be obtained in sufficient quantity in the country.

## A GERMAN'S VIEW OF GERMAN CLERKS IN ENGLAND.

KUHLOW thus supplements Mr. Goschen's late speech bearing on this subject:—

Perhaps one of the reasons why the competition of German clerks presses so hardly upon their English confrères in London is that the latter are wont to make too distinct a difference between work which is interesting in itself, and work the interest of which begins with the payment received for it—and ends there. That such work as the latter exists, and is even widely distributed, there can be no doubt. Interest is a very delicate, and in some personalities a very rare, attitude of the mental system which cannot be "got up" like steam, men not being mere machines. But, at the same time, the very absence of all intellectual interest can be and should be a spur to intenser effort. Where mental interest is unavoidably absent, its only substitute is personal application. This is what the English clerks forget. They imagine that the innate dryness of business detail, adding up columns of figures eternally, writing the same formulæ in commercial letters, or sorting bills, is an excuse for executing such tasks carelessly or insufficiently, and forgetting all about them when completed. Many fall into the most fatal of all errors, that of being superior to their work. The rudiments of French and German are dry and uninteresting, so the English clerk fails to acquire these languages. The principles of commercial science are to some the dullest things in the world. So the English clerk starts off for his game of football, and laughs at those who trouble their heads with more serious matters. How can he expect, however, to compete with those who do? Before any really good position can be attained by the average young man of business, a vast deal of drudgery must be endured. A genuine love of work for its own sake, and a determination to apply all his mental and physical forces to the task in hand, even when an uninteresting one, is that characteristic which has most of all enabled the young German clerk to succeed in foreign countries. The misfortune of the English clerk is not that he has been insufficiently crammed with technical knowledge, but that his schools have failed to make him recognise the importance, necessity, and above all, the dignity of work.

# Correspondence.

### *ANSWERS TO CORRESPONDENTS.*

Yorkshireman.—We think the correspondence *re* the Institute of Chemistry has gone far enough for the present. Give the Council a chance to do something.

Tar Distiller.—You are mistaken. We have no desire to see benzol down, quite the contrary; but we do not make the market.

J. C.—In a few weeks.

D. D. C.—Your communication is only suitable for our advertising columns. It is not new.

R. J. A.—We thank you for your testimonial; "Good wine needs no bush."

Oil Merchant.—We do not know. Not having heard of the process, cannot form any opinion.

T. R.—£43,000; it is your mistake. We said £35,000 to £40,000.

H. J.—The blue-book is not yet published. Get a Patent Agent to supply it you when it appears.

K. H.—Yes, send us the samples together with a description, and we will see whether it is suitable. We think so.

Farmer.—You cannot do better than top dress with one and a half hundredweight of sulphate of ammonia. See note in present number.

Legal.—We hope to complete the case in our next number. It is *not* our intention to publish the account in pamphlet form. Write for the back numbers.

Gas Tar.—We cannot advise you.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

### THE HARGREAVES THERMO-MOTOR.

*To the Editor of the Chemical Trade Journal.*

Sir,—I thank you for your courtesy in sending me a copy of your last issue containing an attack upon me which would otherwise not have been brought to my notice. I have not the remotest idea who wrote the article, and I can hardly imagine that the writer can have any ground for personal malice, but the tone of the attack is so extraordinary that I cannot account for it.

I certainly made a mistake at the moment of writing that particular sentence in my letter to the *Engineer*. I was ill in bed at the time and did not revise the letter in consequence. The moment I saw the letter again, namely, on the evening of its publication, I noticed this slip, and wrote to the *Engineer* to point it out and correct it. The mistake had its origin, not in any forgetfulness of chemical principles, but in momentarily forgetting that the function of the air pump in this particular engine was to supply air for combustion. My letter was about what are somewhat grotesquely called "Caloric" engines, and as in the majority of these the air is pumped in, not to be burnt, but simply to be heated, I fell into this stupid piece of carelessness.

My reference to Hargreaves' Thermo-Motor was contained in three lines, which three lines included the remark, "I do not wish to criticise its construction adversely." My letter contained 150 lines, and the perfectly casual remark contained in the two lines referring to the the Thermo-Motor had absolutely no bearing on the contents of the remaining 148. I will leave your readers to judge whether it was worth while to devote a whole column of your space to a savage attack upon me for an inadvertence that had no effect upon what I wrote to explain, and which had already been promptly and publicly apologised for. The writer courteously suggests that the error "was pointed out to me by someone whose chemical knowledge was better than mine." No one even yet has mentioned the matter to me, except one man who noticed it because of my own published correction

Is it not rather foolish, rather apt to overreach the writer's own aim, to suggest that I am ignorant of, or not familiar with, the fundamental chemical principles of combustion? I have worked at the *theoretical and practical details* of combustion in boiler furnaces and gas-engines for twenty years, and have taught them to a generation of engineering students. The subject has been of so constant interest to me that I believe I have made a larger number of calculations of heat generated by combustion under various conditions and with various fuels than any chemical professor or analyst in the country. If this attack had been made in an engineering journal I would not have considered it necessary to defend myself; but I cannot be known among your readers, and, therefore, I think you will willingly give this letter as prominent a position in your next issue as you gave to the article attacking me with such strange and unwarranted vehemence.

If the writer of your leader would apply himself to the consideration of the remaining 147 lines of my letter to the *Engineer*, and enumerate his objections to what is therein stated, then possibly some profit might be derived from the discussion.—Yours truly, ROBERT H. SMITH.

[Owing to want of space our comments on this letter must be deferred till next week.—ED. *C. T. J.*]

## THE TIPPING SYSTEM.

*To the Editor of the Chemical Trade Journal.*

Sir,—There is one side of the question your correspondents have not touched upon with reference to what you call the tipping system, and that is the direct inducement offered by many travellers to buy from them. From the tone of the letters which have already appeared it would seem that the only black sheep were those who accepted these tips. I speak from actual knowledge that most of the evil results from the action of the various firms' travellers in endeavouring to push business for themselves, as most of them work on the "commission" principle in more ways than one. To give an instance, I am one of those just now much maligned persons called gas-managers, and although I may not be believed, yet I can say without fear that although I have received a few boxes of cigars or a turkey or two at Christmas (with my directors' knowledge and consent) I have never tumbled to the practice of receiving so much per cent. on all orders I have given out. Not but what the opportunity has often presented itself. To give an instance, a traveller for oil of vitriol came round one day and offered his wares, and when I found he could not supply me as cheaply as I was already buying at, I concluded the business by politely wishing him good morning. I was not to be let off so easily however, and he invited me to his hotel to dine, which I accepted. During the conversation over a bottle of champagne he offered me 10 per cent. on all vitriol orders, and when I distinctly told him that all business would have to be done on its own merits he still pressed the matter adding—"Whatever commission I give you will not enable anyone to say your Company has been defrauded, for they will not, under any circumstances, get their vitriol any cheaper, even if you receive nothing." This is an instance of the arguments which are often employed to tempt people to order, and in many instances to underpaid officials it is indeed a very great temptation. I shall be glad to see some other letters on this subject from those who have had offers held out to them as I have had.—I am, etc.,

A GAS ENGINEER.

P.S.—There is no doubt the individual alluded to here will recognise my *nom de plume*, as when he visited me he had in his hand one of the early numbers of the *Chemical Trade Journal*—he is evidently a subscriber. If he recognises me all well and good, but I do not wish for others to know who I am.—G. E.

# Our Book Shelf.

A DIARY FOR THE BREWING ROOM. Prologue of 69 pp. and five plates. A. Boake and Co., London.

It is not often that a diary for office use, whether intended for the general public, or for use by those engaged in any special industry, is furnished with good readable matter; but in the case of the one before us we feel bound to say that the exception proves the rule.

Dr. Maddox is well known in the microscopical world not only as a microscopical expert, pure and simple, but as an investigator who has always been to the front in delineating what he has seen "under the tube" by means of photography. It is pleasant, therefore, to take up this diary and find an article on "The Ferments Found in the Deposits of Beer" from his pen. And not only do we find a number of pages of carefully-written letterpress, explaining many matters—we feel bound to say—are not understood by many brewers, but we also find the letterpress supplemented by a series of five plates, showing not alone what Dr. Maddox has seen by means of his patient investigation, but what he desires all interested in these matters should see also. Microscopical investigation is not always so easy as it appears at first sight, and therefore to those who are not able to see these things in nature, may view with absolute consciousness of their being accurate, the plates prepared for them as being the next best thing to nature itself.

An interesting chapter has been written by Mr. R. Bannister, exposing at one place the *faithfulness* of the Commons to their pledges, and at another the rapid and enormous growth of the brewing industry. From one of the tables we gather that, practically, the consumption of beer in the United Kingdom is 27 gallons per head; so that seeing we have many total abstainers in our midst, and that newly-born babies are not fed on this beverage, a great many of our population must be drinking more than is any good for them. A pint a day for each of the 365 days of the year would amount to 46 gallons per year. Another article, on "Brewing in India," is very good reading; and that by Mr. F. G. A. Roberts, on "A Holiday Visit to America," will be read with interest by every brewer in the country.

"Popular Beverages," by Mr. P. L. Simmonds, a well-known writer on trade matters, contains many interesting statistics, the remainder of the prologue being taken up with miscellaneous tables of great use to the brewing fraternity.

We feel sure that the issue of such a diary as this will do more good to the industry for which it is intended than many elaborate text-books; and no one can say that, after having perused its pages, he has not become a wiser man.

## SULPHATE OF AMMONIA MANURES.

AN estimate of wheat growing is contained in a pamphlet by Mr. John Cropley, of Walthamstow, and gives a fair idea of the cost of production of an acre of wheat in the home counties on some farms. We do not cite this as a specimen of good farming, as twelve loads of "farmyard" without sulphate or nitrate, even with the waste of a year's fallow time will never pay in this country. We would advise Mr. Cropley, instead of giving a year's fallow, to add 1½ cwts. of sulphate of ammonia (or nitrate on chalk soils), to his twelve loads of farmyard manure, and give us a second balance sheet of the operation.

*Cr. and Dr. of one acre, lying fallow one year:—*

| | £ s. d. | | £ s. d. |
|---|---|---|---|
| Two years' rent | 1 10 0 | 28 Bushels wheat | 5 12 0 |
| " " tithe | 0 10 0 | 1½ Loads straw | 1 15 0 |
| " " rates and taxes | 0 17 0 | Unexhausted manure | 1 0 0 |
| Four ploughings | 2 8 0 | Carvings | 0 2 6 |
| Clod crushing and rolling | 0 6 0 | Loss | 2 1 0 |
| Twice harrowing | 0 2 6 | | |
| 12 Loads of manure and spreading | 2 8 0 | | |
| Seed corn | 0 10 0 | | |
| Drilling, &c. | 0 4 0 | | |
| Hoeing | 0 5 0 | | |
| Cutting, carrying, thrashing, marketing, &c. | 1 5 0 | | |
| Wear and tear and accidents | 0 5 0 | | |
| | £10 10 6 | | £10 10 6 |

The average yield of wheat over the whole of England in 1885, was 31⅓ bushels per acre, and this quantity would carry away with it nitrogen equal to 219lb. of sulphate of ammonia; phosphoric acid equal to 70lb. of steamed bone meal; and potash, equal to 224lb. of Kainit.

It is astonishing to find that the British wheat crop carries away with it annually nitrogen equal to 250,000 tons of sulphate of ammonia.

THE THARSIS COMPANY AND THE COPPER SYNDICATE.—It was reported in Glasgow last week that the Tharsis Copper Company had made arrangements with the Paris Syndicate by which the Syndicate take the Company's output for three years on advantageous terms.

# Trade Notes.

The Dangers of Tinned Foods.—The researches of Ungar and Bodlander, published in the current number of the *Zeitschrift für Hygiene*, prove, beyond question, that there is a danger in preserving meats in tinned cases. The tin is apt to be attacked, forming noxious compounds with substances in the preserve, especially if there be in the latter, as there most frequently is, tartaric acid, common salt, or saltpetre. Tin, in feeble doses even, as is the case with lead, copper, antimony, or arsenic, is capable of doing great harm. With divers substances containing tin, and notably tin-triethyl compounds, dogs, cats, rabbits, and frogs have been grievously afflicted, even unto death. Whether injected under the skin of the animals or given amongst the food, these slow poisons were observed to have the same deleterious effect.

Guinness's Liquors.—"X" may be an unknown quantity; but "XX," the outward symbol of the potent and palatable beverage brewed by Messrs. Guinness Sons, & Co., represents an apparently very gratifying quantity to those fortunate enough to possess shares in the concern. A Dublin telegram announces that Messrs. Guinness have declared an interim dividend of 14 per cent. Great is the might of beer.

The Marquis of Salisbury's Electrical Installation. The paper read before the Institution of Mechanical Engineers by Mr. William Geipel, contains much that is interesting about the applications of electricity made by the Marquis of Salisbury at Hatfield. The river Lea is used to generate electricity by means of turbines, whence it is transmitted to the house and over the estate for a variety of purposes. Pumping and ice-making machinery and an air-propeller fixed in the roof for ventilating, are driven by the motors at the house, while those on the farm are used for stacking hay and corn sheaves, for cutting rough grass for ensilage, for grinding corn, for making fodder, and for many other things. The Premier has used his motors also for pile-driving, for making coffer dams in the river, and for dredging it and clearing it of weeds. By the same means the town sewage has been been pumped into a tank 30ft. high, for irrigation.

A New Tinplate Works at Llanelly.—The project for establishing a new tinplate works at Llanelly is now assuming definite shape, and not improbably building operations will be shortly commenced. According to the *Llanelly and County Guardian*, the company has already been practically formed, and several well-known commercial gentlemen are said to have an interest in it. The site of the works will probably be at the new dock, near that of the old coke works.

Costs of the Sewerage Dispute at Wolverhampton.—At the quarterly meeting of the Town Council a report was presented by the Sewerage Committee giving the expenses incurred in connection with the proceedings instituted by Mr. Gifford against the corporation relative to the pollution of a neighbouring stream. The result of the taxed bills of both the action and arbitration is as follows:—The bill in the action as originally delivered, inclusive of all payments out of pocket, amounted to £2,688. 3s. 4d. There was taxed off this amount the sum of £1,629. 15s. 3d., leaving a balance of £1,058. 8s. 1d., exclusive of taxation fees, or equal to a reduction of 60·63 per cent. of the original bill. The bill in the arbitration, as originally delivered, amounted to £2,025. os. 1d. From this amount £1,189. 14s. 9d. was taxed off, leaving a balance, exclusive of taxation fees, of £835. 5s. 4d., showing a reduction by taxation of 58·75 per cent. upon the bill as delivered. What costs some people put themselves to in order to be made to do right.

The Cost of Arc Lighting.—However it may be with the costliness of incandescent electric lighting, according to Mr. William Geipel and others, the arc light in railway stations and places where concentrated light is required is cheaper than gas. The proof given is that, in the Waverley Station, Edinburgh, "thirty-nine arc lamps, having 53,068 lamp hours, cost 1·79 penny per lamp hour." The trial made at the same station is said to prove that the cost of working becomes less as the use extends.

Welding by Electricity.—We have several times referred to the progress being made in the application of powerful electrical currents to welding and soldering. A most ingenious contrivance of the kind is Von Bernardo's system, an explanation of which Professor Ruhlmann has been giving to the Electro-Technical Society of Berlin. In this system, the arc itself, which acts like a blowpipe, is directed along the crack or edge of the metal to be operated upon. The positive pole of the arc is a carbon rod, the negative pole is the metal to be fused. Those who have seen the appliance speak highly of it as a means of repairing cracks and leaks in boilers, etc.

Detection of Adulteration in Clarets.—Senor de la Puerta, of the Madrid Royal Academy of Medicine, has hit upon an ingenious contrivance for finding out whether red wine is artificially coloured. By mixing lime water with the wine, in the proportions of 2 to 1, the red colour of the liquid will immediately disappear if the wine be pure, and have nothing but the colour which nature gave it. It will assume a dirty greenish tint. But the lime water has no effect upon fuchsine or any other of the aniline colours now so largely used in the manufacture or adulteration of clarets.

Gold in Wales.—Another find of gold was reported yesterday from Dolgelly, North Wales, a valuable lode having been discovered at Cefn Rowen, at the foot of Cader Idris, where experiments are now being made. A quantity of gold quartz has been sent up to London to be analysed. A quantity of gold-bearing quartz has also been discovered at the Langyrome Lead Mines by Mr. R. Owen, mining agent. Mr. Owen states that the samples which have been analysed contain a considerable proportion of gold and silver, the latter showing an average of 25 ounces to the ton.

Gas Testing.—At the last quarterly meeting of the Walsall Town Council, the Gas Committee recommended that a complete set of testing apparatus be obtained, at a cost of £60, and placed in a spare room at the borough offices, so as to enable the gas to be tested there at any time, independently of the gas manager, and that as an experiment they had accepted the offer of Mr. Cresswell, the gas examiner at Birmingham, to come over to Walsall and make occasional testings. If Mr. Cresswell goes over at unstated times, and, provided that no little bird precedes him, we shall be very interested in the results of these tests.

The French Revenue Returns for 1887.—According to Mr. Crowe's report on the French revenue for 1887, which has just been issued by the Foreign Office, the receipts from all ordinary sources exceeded those of 1886 by 17,203,939f. (£688,156), but they have fallen short of the Budget estimates by 23,897,663f. (£955,904). Direct taxes yielded 777,320,600f. in 1887, against 767,073,100f. in the previous year, and indirect taxes of all kinds 2,938,217,763f. in 1887, against 2,381,013,824f. in 1886. The increase, accordingly, should have been 41,101,602f. The deficit is, therefore, little short of a million sterling in the ordinary Budget of the year. Among the items, says Mr. Crowe, which have disappointed the calculations of financiers, sugar is prominent, producing 44,500,000f. less than the receipts of 1886; the registration tax fell off by 7,000,000f.; stamps and salt show a slight increase, and Customs, spirits, railway fare taxes, posts and telegraphs increased considerably. The advance of 13,739,000f. in the revenue derived from Customs is owing to the increase of the duties on cereals, which have produced enough to counterbalance losses accruing from higher duties on cattle, and leave a considerable surplus. Wine, spirits, and beer gave 411,000,000f.; railway taxes produced 74,750,000f.; posts and telegraphs showed an increase of 4,000,000f., where they were expected to give 9,000,000f. "On the whole it may be said that 1887 has not yielded as much revenue as was hoped for, but the returns are not dangerously below the level of the estimates."

German and British Trade in Norway.—The British Consul-General at Christiania has compiled an elaborate statistical report (Annual Series No. 251) on the trade of Norway, in view of the impending revision of the Norwegian tariff, and also to enable British manufacturers and merchants "to study the causes that operate on the competition of Germany and other countries in Norway in respect of articles of import in which Great Britain, the principal purchaser of Norwegian produce, is interested. Germany's share in the Norwegian import trade is 28·1 per cent., and that of Great Britain 25·5, and ever since 1881 Germany apparently has held the first place. Turning to the detailed tables, we find that between 1880 and 1886 important German imports have increased in the following articles:—Colonial produce, 27 per cent.; yarn, 52; silk textiles, 72; woollens, 26·5; cotton, 26; leather, skins, etc., 6; oils, tallow, fat, and their manufactures, 169; manufactured metals, 194; worked copper, 42; machinery, engines, ships, etc., 170. German imports decreased in the following articles at the percentage affixed to each: Wrought iron, 90; raw and half-manufactured metals, 6; cordage, 28·5; spinning materials, 40; and edibles, 13·8. Great Britain shows a total increase of 40 per cent. in yarn,

13 in cordage, 4 in silk textiles, 6 in woollens, 33·8 in flax, hemp, and jute goods, 2 in oils, tallow, etc. (the German increase being 169 per cent.), 317 in paper, 93·7 in metals raw and half manufactured, and 77 in metals manufactured. We have decreases in edibles, colonial produce, spinning materials, cottons (3 per cent., while the German increase is 26), 75 per cent. in leather, skins, etc., colours, and glass. Perhaps the results of Mr. Michell's numerous and complicated tables may be better expressed in this way as regards the two countries:—Great Britain is beating Germany in cordage, flax, hemp, and jute textiles, carpeting, tarpaulin, etc. (of which this country appears to maintain a monopoly), wax cloth, wooden goods, paper of all kinds, coal, raw and half manufactured metals, wrought and rolled iron, and worked copper (in which Germany runs us very close). Germany beats us slightly in yarns, very badly in silk, woollen, and cotton textiles, in leather and skins, oils, tallow, and their manufactures, colours, bricks, earthenware (in which we have been completely ousted), porcelain, glass, manufactured metals, machinery, and engines. Mr. Michell does not attempt to explain the reasons for British success or failure, but in another part of his report he remarks incidentally that, unfortunately for the commercial interests both of Great Britain and Norway, the British commercial traveller is rarely seen in the latter country. Travellers for German commercial houses do visit Norway, but he speaks of them as a "handful." British candle, soap, and brickmakers, pottery and metal manufacturers, and silk, woollen, and cotton weavers might with advantage send travellers to Christiania to ascertain why they are being beaten by their German competitors.

NICKEL MONEY.—As they have already in Belgium and Germany, and as they are about to have in France, so the Bulgarian Government is going to issue a nickel coinage. The contract for delivery has just been signed by the Vienna firm of Elias. Nickel bids fair, at no distant date, to be the world's small coin metal. Its hardness, its capacity for taking a polish, and the difficulty with which it oxidises render this silver-white, malleable, and weldable metal admirably adapted for purposes of money.

A SAFE BUSINESS.—The report of the Directors of Perry and Co. Limited states that the net profits of the year 1887, after writing off the fixed percentages for depreciation of leaseholds, buildings, plant, fixtures, and goodwill, and after providing for current expenses, managers' salaries, solicitors', auditors', and contingent directors' fees, and the sum of £400 for the Workpeople's Superannuation and Medical Aid Fund, amount to £22,693. 8s. 8d. After deducting the usual payments amounting to £9,645. 3s. 9d., and adding the balance carried forward from last year, viz., £475. 11s. 10d., there remains an available balance of £13,523. 16s. 9d., with which the directors recommend to deal as follows:—To pay on the 1st March on the Preference Shares a dividend of 2½ per cent., making 5 per cent. for the year. This will absorb £2,259; to pay on the 1st March, on the Ordinary Shares, a dividend of 7 per cent. for the six months, free of income tax, making, with the interim dividend paid, a total of 10 per cent. for the year, and absorbing £8,435. 7s.; to carry to the reserve fund (raising it to a total of £45,500) the sum of £2,000; to carry forward to the profit and loss account of next year the sum of £829. 9s. 9d. The fourth series (£1,000) of the 1880 issue of debentures, and the sixth series (£500) of the Holborn Viaduct Premises debentures have been paid off during the past year, in accordance with the terms of issue. In order to facilitate business in Germany the Directors have purchased the business of their agent in Berlin, and are carrying on the trade under the style of Perry and Company Limited (Filiale Berlin). The company's Amsterdam house has also opened a branch at the Hague under the style of Perry and Company (The Hague.) Two directors, Mr. Harry Heaton and Mr. Martyn J. Smith, retire by rotation, and being eligible, offer themselves for re-election.

NOTICE OF DISSOLUTION OF PARTNERSHIP.—Notice is hereby given, that the partnership heretofore subsisting between us the undersigned, Holbrook Gaskell, David Gamble, Samuel Hall, Holbrook Gaskell the younger, Eustace Carey, Henry Wade Deacon, James Bellhouse Gaskell, Frank Gaskell, and Allan Deacon, carrying on business as alkali and chemical manufacturers, at Widnes, in the county of Lancaster, under the style or firm of Gaskell, Deacon and Co., has been dissolved, by mutual consent, so far as regards the said Allan Deacon, who retires from the firm, as from the 2nd day of January, 1888, the business as from that date being carried on by the remaining partners.

A CITY IN DARKNESS.—A remarkable incident happened at Canterbury, on Saturday the 11th inst., by which considerable alarm was caused. At about eight o'clock, when business was at its height, and the streets thronged with people, the gas supply of the entire place was suddenly turned off. It would seem that the occurrence was due to the mistake of an employé at the Gasworks, who acting under the impression that he was turning on an additional supply of gas, did the reverse. The mistake was, of course, immediately rectified, and every possible means adopted by the engineer of the company (Mr. T. May) to prevent any serious results happening. The lights in the shops and the streets were at once renewed. Only the cathedral precincts and its residences, which have their own gasworks, escaped being thrown into darkness.

THE ITALIAN CUSTOMS TARIFF.—The secretary of the London Chamber of Commerce has received the following memorandum from the Under-Secretary of State for Foreign Affairs:—"On December 30th last, three Royal decrees approved the prolongation up to March 1st next of the three existing commercial treaties between Italy and France and Switzerland and Spain, so that at all events up to March 1st next Great Britain will enjoy the conventional duties assured to the above three countries. On the other hand, such of the new duties of the general Italian customs tariff as are not bound by the above treaties nor by the new treaty with Austria have been applied to all imports into Italy since January 1st. As, however, in some cases confusion would arise owing, for instance, to cotton tissues remaining under conventional treatment while cotton yarns and warps were subjected to the general tariff duties, it has been decided by Royal decree, for such time as tissues of cotton, pig-iron, and steel shall benefit by existing conventional treatment, to apply to yarn and warps of cotton, and to scrap pig-iron and steel the treatment established by the tariff law consolidated by decree of August 9th, 1883, instead of the rates established in Articles 96, 97, 98, 99, 100, and 200 of the new general customs tariff of July 14th, 1887. A recent circular referring to the above subject states that in all cases where the duty in the general tariff may be lower than those of the conventional tariff for the same articles, the lower duty will be levied." The secretary of the London Chamber of Commerce will be glad to receive any communications from interested parties on the above.

BRITISH COAL SHIPMENTS, JANUARY, 1888:—

| | Foreign. | | Coastwise. | |
|---|---|---|---|---|
| | 1888. | 1887. | 1888. | 1887. |
| Cardiff | 688,800 | 641,837 | 99,060 | 103,157 |
| Newport | 180,685 | 183,714 | 75,694 | 93,352 |
| Swansea | 68,028 | 55,550 | 52,230 | 58,111 |
| Newcastle | 258,551 | 286,212 | 315,293 | 289,239 |
| South Shields | 17,415 | 22,929 | 23,524 | 47,290 |
| Blyth | 31,566 | 24,257 | 8,215 | 5,596 |
| Kirkcaldy | 51,620 | — | 5,089 | — |
| Sunderland | 85,361 | 80,585 | 243,234 | 244,370 |
| Seaham | 2,360 | 4,955 | 47,922 | 47,402 |
| W. Hartlepool | 18,593 | 29,196 | 45,259 | 48,082 |
| Middlesbrough | 1,911 | 1,251 | 440 | 1,841 |
| Whitehaven | — | — | 10,486 | 16,905 |
| Hull | 44,969 | 33,278 | 14,399 | 4,520 |
| Grangemouth | 30,979 | 18,243 | — | — |
| Stockton | — | — | — | 170 |
| Llanelly | 9,042 | 8,840 | 5,533 | 4,447 |
| Goole | 39,743 | 37,564 | 18,166 | 13,259 |
| Alloa | 13,593 | 19,039 | 590 | 900 |
| Amble | 9,557 | 7,495 | 17,018 | 16,210 |
| N. Shields | 27,664 | 21,110 | 1,400 | — |
| Glasgow | 63,384 | 39,911 | — | — |
| Borrowstones | 23,172 | 9,700 | 3,570 | 4,049 |
| Ayr | 1,434 | 2,159 | 26,902 | 15,664 |
| Troon | 3,680 | 4,290 | 15,468 | 12,684 |
| Irvine | — | — | 8,582 | 5,505 |
| Greenock | 2,073 | 1,123 | — | — |
| Granton | 5,899 | 3,539 | — | — |
| Ardrossan | 385 | — | 5,343 | 6,679 |
| Dundee | 188 | — | — | — |
| Liverpool | 36,839 | 34,184 | 63,452 | 73,548 |
| Grimsby | 23,109 | 20,330 | 1,921 | 1,543 |

RE-OPENING OF A CUMBERLAND LEAD MINE.—The well-known lead mine of Roughtengill, situated in the heart of the Coldbeck Fells, in Mid-Cumberland, has been restarted on a small scale by West Cumberland capitalists, but, in the coming spring and summer, a considerable number of men will be set to work in it.

Mining and Mechanical Engineers.—A general meeting of the members of the North of England Institute of Mining and Mechanical Engineers was held on Saturday last, in the Wood Memorial Hall, Newcastle, Mr. J. B. Simpson in the chair. Mr. Charles J. Morton read a paper on "The Coal Field of Tkilboulli (Caucasus)," which he visited in 1886.—A paper by Professor A. S. Herschell, describing an improved form of seismoscope was read.—Mr. Nicholson and Mr. Urquhart were present at the meeting, and exhibited a new electric safety miners' lamp, the "Sun," which has been brought out by a small syndicate of scientific gentlemen.—Mr. Urquhart explained that the lamp had a new form of secondary battery, consisting entirely of the material which was required for it, and not burdened, as in other secondary batteries, with a larger amount of dead lead, which made a battery very heavy. The lamp weighed about 4lbs., and its price was £1 1s.; the cost of maintenance, charging, and attendant's wages for a fair average number had been carefully estimated at 3d. per week. The illuminating power was 1¼ to 1½ candle, and this illuminating power could be sustained for ten hours, and in the succeeding two hours would die away. With a reflector the illuminating power was equal to 2½ candles, and in one small beam was 4 candles. A great many questions about the lamp were asked, and Mr. Urquhart answered them, after which Mr. Cochrane proposed a vote of thanks to the gentlemen who had exhibited the lamp, and in doing so remarked that the light seemed to be effective, whether its duration would be equal to what was stated had yet to be proved; in regard to portability the lamp seemed to be very satisfactory.—An interesting discussion took place upon a paper read at the previous meeting by Mr. M. W. Brown, on "A further attempt for the correlation of the coal seams of the carboniferous formation of the North of England"; and the discussion of the subject was further adjourned.

The Impending Water Famine.—The Liverpool Water Committee issued a notice this week stating that the deficient rainfall and the consequent low stock of water in the reservoirs have rendered it absolutely necessary to further restrict the hours of supply, and that from the 17th the supply will be shut off from six o'clock in the evening until seven o'clock the following morning, and from ten in the forenoon until three in the afternoon.

Weaver Hall Brine, Salt and Chemical Co. Limited. Mr. Thomas Barrow, of Rock Ferry, Birkenhead, who has had much to do in the promotion of the above company, writes as follows:—"I find that several in the salt trade are dissuading intending applicants from investing in the above concern, and I would like to put the public right against the interested views put forward by the trade. As the promoter of this company, I have not embarked upon the enterprise without fully satisfying myself of the value of the concern. If Brunner, Mond and Co., who have just declared a dividend of 25 per cent., carrying forward a balance of £35,488, can make the profits they do, why should not the Weaver Hall Company, whose plant and machinery will be erected at half the cost of Brunner, Mond's, pay higher dividends? The Weaver Hall Company has more land, brine, clay, sand, and a better water power than any existing company; and this view is fully borne out by Mr. Thomas Ward, of Northwich—one in the trade and the first salt expert in England. He says:—'As regards the opinions of salt proprietors, I simply ignore them, because their opinions are made to suit their own interests; and with a competent engineer and chemist, I know of nothing to prevent the scheme proving a great success. Brine may be had at Weaver Hall when short elsewhere.'" We understand that shares in the concern have been fairly well taken by Winsford working men. Up to the present there is nothing to show that the construction of the works is progressing,

## NITRATE OF SODA PRICES AT LIVERPOOL DURING THE LAST DECADE.

| | 1878. | 1879. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|---|---|---|---|---|---|
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| January 31st ..... | 15 6 | 13 0 | 18 10½ | 15 3 | 14 3 | 12 0 | 10 3 | 9 0 | 10 10½ | 9 4½ |
| February 28th ..... | 15 9 | 13 3 | 18 9 | 15 3 | 14 1½ | 12 6 | 9 10½ | 9 1½ | 10 10½ | 9 9 |
| March 31st ..... | 16 0 | 13 3 | 18 0 | 15 6 | 14 7½ | 12 4½ | 9 6 | 9 4½ | 11 1½ | 10 7½ |
| April 30th ..... | 16 0 | 13 4½ | 15 0 | 15 4½ | 13 9 | 11 10½ | 9 6 | 9 10½ | 10 3 | 11 6 |
| May 31st ..... | 15 6 | 14 0 | 13 6 | 13 9 | 13 0 | 10 9 | 9 0 | 9 4½ | 9 1½ | 10 0 |
| June 30th ..... | 15 6 | 14 9 | 14 3 | 13 7½ | 12 6 | 11 0 | 9 6 | 10 0 | 9 1½ | 9 0 |
| July 31st..... | 15 0 | 14 9 | 14 6 | 13 10½ | 13 0 | 10 6 | 10 1½ | 11 0 | 8 10½ | 8 9 |
| August 31st ..... | 14 6 | 14 6 | 14 9 | 14 6 | 12 9 | 10 9 | 10 1½ | 10 10½ | 8 10½ | 8 7½ |
| September 30th ..... | 14 3 | 15 0 | 14 0 | 14 7½ | 12 6 | 10 9 | 9 9 | 11 1½ | 8 10½ | 8 10½ |
| October 31st ..... | 13 6 | 18 0 | 14 0 | 14 6 | 12 0 | 10 4½ | 9 1½ | 10 4½ | 8 10½ | 8 10½ |
| November 30th..... | 13 0 | 18 9 | 14 3 | 15 6 | 12 3 | 10 3 | 9 1½ | 10 6 | 8 9 | 8 9 |
| December 31st ..... | 12 9 | 19 0 | 14 9 | 14 7½ | 12 0 | 10 0 | 9 0 | 11 1½ | 8 10½ | 9 1½ |

A Successful Wagon Company.—On Friday, the 3rd inst., the Bristol and South Wales Railway Wagon Company Limited, held their half-yearly meeting at Bristol, at which it was stated that the six months' working had been highly successful, and admitted of a 10 per cent. dividend being paid. The directors had just carried £500 to the contingent fund, the revenue account showed a disposable balance of £5,500, and, after paying the dividend named, £400 would be carried to the current account. The rolling stock of the company consisted of 11,000 wagons and carriages, and 13 locomotive engines.

Reported Formation of a Nickel Syndicate.—The *Soir* announces the formation of a nickel syndicate. Amongst the financial notabilities mentioned in connection therewith are most of those who figure in the copper syndicate. It will be remembered that the French Government has submitted a bill to replace copper money by a nickel coinage. The house of Rothschild, or at least a group acting on its account, two months ago entered into a contract with the State for the execution of this important operation. If the project be sanctioned by the Chambers, the financial group which has signed the convention will have done a good stroke of business in taking, at £40 per ton, 13,000 tons of copper which will be demonetised, and upon which it will make a profit at the actual quotation of from ten to twelve millions of francs without taking into account the gain on the nickel.

An Ironworks to be Re-started.—The Bromford ironworks, West Bromwich, which have been idle since the failure of Messrs. John Dawes and Sons, are to be re-started. The works are one of the most extensive in Staffordshire, and consist of sixty-eight puddling furnaces and seven mills. The new proprietors, who will trade as the Bromford Iron Company, have acquired forty puddling furnaces and four merchant mills. Preparations are being made for re-starting all these. A hundred hands will first be set on, afterwards two hundred and fifty more. This is the best news which Staffordshire has had for a long time.

Liverpool Rubber Company Limited.—The annual general meeting of the shareholders of this company was held on Friday, the 3rd inst., at the works, Vauxhall-road. Mr. H. G. Tippet, chairman of the directors, presided. The report stated that the available balance to profit and loss account was £12,307, out of which the directors recommended a dividend of 7½ per cent. on both ordinary and preference shares, and out of the balance remaining to write off £2,000 from the machinery account as an extra depreciation, and £2,000 off the buildings, carrying forward to the next account £3,045 11s. 6d. The directors also recommended that in order to afford greater facility in dealing with their shares the articles of association should be amended so as to admit of a subdivision of the shares, ten shares of £5 each nominal to be issued in place of the existing £50 shares

ADVERTISING EXTRAORDINARY!—An esteemed correspondent, who is fond of his joke, sends us a cutting from *Stubbs's Gazette*, and facetiously remarks—"Is this a case of judicious or injudicious advertising?" Here is the cutting:—

GEORGE CONDY, BANKRUPT,

Chemical Agent, Knox Road, Clapham Junction, and Cologne Road, New Wandsworth.

List of Creditors:—

| | £ | s. | d. |
|---|---|---|---|
| Barker, G. & Co., London | 17 | 0 | 0 |
| Bowles & Cross, London | 25 | 0 | 0 |
| British and Colonial Printer, London | 25 | 0 | 0 |
| British and Colonial Druggist, London | 30 | 0 | 0 |
| Journal of Commerce, London | 10 | 0 | 0 |
| Grocery Journal, Glasgow | 30 | 0 | 0 |
| Mercantile Gazette, London | 40 | 0 | 0 |
| Bristol Time Tables Company, Bristol | 15 | 0 | 0 |
| Burgoynes & Co., London | 30 | 0 | 0 |
| Carrel, M. J., London | 19 | 9 | 0 |
| Celtic Times, Dublin | 12 | 0 | 0 |
| Chamber of Commerce Journal, London | 10 | 0 | 0 |
| Christian Union, London | 10 | 10 | 0 |
| Coachmakers' Journal, London | 10 | 10 | 0 |
| Colonial Trade Journal, London | 25 | 0 | 0 |
| Civil Service Competitor, London | 10 | 0 | 0 |
| Contract Journal, London | 10 | 0 | 0 |
| Dramatic Review, London | 13 | 10 | 0 |
| East Australian Journal, London | 20 | 0 | 0 |
| East London Dispatch, South Africa | 10 | 0 | 0 |
| Grocer Association, London | 18 | 0 | 0 |
| Health Journal, London | 10 | 0 | 0 |
| Heywood's Railway Guide, Manchester | 11 | 11 | 0 |
| El Exportados, Hamburg | 11 | 0 | 0 |
| Exporteur, Hamburg | 10 | 0 | 0 |
| European Mail, London | 10 | 0 | 0 |
| Goodall & Co., Leeds | 10 | 0 | 0 |
| Irish Cyclist, Dublin | 15 | 0 | 0 |
| Ironmongers' Journal, London | 10 | 10 | 0 |
| Invention, London | 20 | 0 | 0 |
| Indent, The, London | 10 | 0 | 0 |
| Laundry Journal, London | 34 | 10 | 0 |
| Martineau & Smith, Birmingham | 18 | 0 | 0 |
| Manufacturer, The, London | 15 | 6 | 0 |
| Mason, H., London | 12 | 10 | 0 |
| Montreal Bulletin, Montreal | 10 | 0 | 0 |
| Nautical Gazette, New York | 31 | 3 | 8 |
| Nautical Magazine, London | 36 | 0 | 0 |
| Oppenheimer Bros., London | 12 | 12 | 0 |
| Planters' Gazette, London | 10 | 10 | 0 |
| Railway Herald, London | 12 | 10 | 0 |
| Richmond Observer, Ripon | 10 | 12 | 9 |
| Salford Chroncle, Salford | 11 | 0 | 0 |
| Sanitary Record, London | 14 | 14 | 0 |
| Sanitas Co. Limited, London | 179 | 0 | 0 |
| Store, The, London | 10 | 10 | 0 |
| Sydney Review, Sydney | 12 | 12 | 0 |
| Tickle's Colonial Journal, London | 20 | 0 | 0 |
| Topical Times, London | 10 | 8 | 0 |
| Weigall, J. E., London | 500 | 0 | 0 |
| White and Pike, Birmingham | 12 | 0 | 0 |
| Willmer Bros., Birkenhead | 12 | 6 | 0 |
| Mc.Corquodale & Co., Leeds | 10 | 15 | 0 |
| Wall, T., London | 15 | 0 | 0 |
| And creditors under £10 | | | |
| Total | £1742 | 0 | 0 |

In answer to our correspondent, we must venture to express the opinion that this is a case of *very injudicious* advertising indeed! He will notice that the *Chemical Trade Journal* is *not* included in the formidable array of newspapers that have conveyed to a confiding public the extraordinary merits of Mr. George Condy's wares. Perhaps if it had been, the result might have been different. Mr. Condy might not have come to a dead stop, and our contemporaries not have been scheduled. We speak, however, with some amount of diffidence, for although the *Chemical Trade Journal* has a wide clientelage, we are somewhat doubtful whether it reaches the particular class of *buyers* whom Mr. Condy's productions would mostly benefit, and if *Tickle's Journal*, *The Indent*, *The Christian Union*, *The Planter's Gazette*, and *The Laundry Journal*, &c., &c., failed to secure an outlet for Mr. George Condy's manufactures, we are afraid it was a bad look out for that gentleman.

THE DESPERATE RIOT AT RIO TINTO.—With reference to the telegrams in the newspapers respecting the disturbances at the mines at Rio Tinto the Board of the Company desire to say that they have received information from the manager to the effect that the disturbances were not created by their workmen, but by smoke agitators from the outside. A large body of men to the number of 4,000 or 5,000 arrived at the mines in the morning and drove the men from their work. The Governor of Huelva, with troops, arrived on the scene in the afternoon, and on attempting to address the people was met with seditious cries and the firing of some shots. Finally the crowd was dispersed by the troops, and some fifteen of the rioters were killed. Order seems to be restored.

THE ST. HELENS WASTE HEAPS.—Why should the Widnes Local Board bother their heads over the waste heaps? Ammonia-soda will soon cure the evil, and as no one seems to have been injured during a full production of forty years why should there be this outcry now, when alkali waste is threatened with extinction. Do away with the waste heaps and travellers by railway will lose an invaluable landmark, which does not depend upon ocular demonstration alone.

ST. HELENS AND THE ALKALI ACT INSPECTOR.—The St. Helens Town Council seems in a state of alarm lest Mr. Ballard, the resident inspector under the Alkali, etc., Works Regulation Act, should deprive the town of his services by going to reside at Chester. From this it would appear that Mr. Ballard's presence is alone sufficient to prevent St. Helens from being dissolved in its own gas. Let each manufacturer do his best to suppress the emission of noxious vapours, and we venture to say that St. Helens will still go on without coming to a dead stop.

THE STAFFORDSHIRE MINES.—On Wednesday, the 1st inst., at the meeting of the South Staffordshire Mines Drainage Commissioners, Wolverhampton, Mr. Walter Williams presiding, a new and rather vigorous departure in their proceedings took place. After it had been decided to levy a surface drainage rate of 1d. per ton on all coal and minerals raised in the drainage area, Mr. Bassano, a member of the triumvirate, proposed that the law clerk be instructed to inquire into cases of certain colliery owners which had been investigated by the committee with the view of criminal proceedings being taken against those who, it was alleged, had made fraudulent returns of the quantities of coal and minerals they had raised from their pits. He stated that the committee had had certain facts brought before them from which they had reason to believe that in many instances the returns made were six or seven times below the quantities actually raised. The committee had for some time suspected the returns, and now they had actual proof. Mr. Smith seconded the motion, and it was adopted. It was explained that in the Bilston district some of the mines long submerged with water had been drained and were ready for re-opening. Mr. Wilson Lloyd, a commissioner, complained that in the Wednesbury district many of the mine owners had paid large sums of money in rates without receiving any benefit. It was estimated that there were eight million tons of coal in the Wednesdury basin, which, at 1d. per ton, would yield between £30,000 and £35,000. He said that a scheme would probably be suggested to give the commissioners a sum of about £30,000, and to dispense with the levying of a 6d. drainage rate in the Wednesbury and Darlaston districts, to allow the mine owners themselves to drain the pits. Against the contention that these coalmasters were treated unfairly it was urged that the alleged grievances were under careful consideration.

SWANSEA COPPER TRADE REPORT.—The stocks of copper produce remaining unsold at Swansea on the 1st February were:—885 tons ore, 1121 tons copper, and 108 tons precipitate, equivalent to 1356 tons fine copper. Private sales during the past month consist of 41 tons Tilt Cove ore, at 13s. 1½d.; 15 tons Cape ore at 13s. spot; 615 tons Cape ore on private terms; and 70 tons Namaqua ore at 14s., to arrive. Chili charters for the first half of January were reported as 800 tons fine. Last month's market for Chili bars was very irregular, opening with cash parcels at £85, and keeping steady at about that figure for several days. On the 10th prices dropped to £80. 10s., and on the 16th the market was completely demoralised, sales taking place at £74. 10s., prices fluctuating from that to end of month between £73. 7s. 6d. to £79, finally closing at £76. 15s. This unsteadiness is owing to the action of the syndicate in selling large quantities of bars, in two days parting with 3,000 tons. Quotations, February 1st:—Ores and regulus, 13s. to 13s. 6d.; Chili bars (g.o.b.'s), £76. 15s. to £77. 10s.; tough ingot, £75 to £80.

ANALYSIS OF METEORIC IRON.—After the violent thunderstorm which burst over London on August 17 last year, a small mass of meteoric iron, commonly known as a thunderbolt, was found in a garden at Brixton. The mass had the form of an oblate spheroid, and measured about two inches across its major diameter. The substance has been carefully analysed by Mr. J. J. Morgan, of Ebbw vale, who finds it to contain the following substances:—Silica, 0·566; nickel, 1·375; iron, 46·276; sulphur, 46·053; lime, 5·478—total, 99·748. The deficiency of ·252 in the 100 parts is accounted for as being due either to experimental error, or to the presence of very minute quantities of some metal or metals which the analyst failed to discover.

THE PROHIBITION OF THE EMPLOYMENT OF FOREIGNERS IN FRENCH AGRICULTURAL ESTABLISHMENTS.—The French Minister of Agriculture has addressed a circular to the heads of departments under his administration forbidding the employment of all foreigners in French Government agricultural establishments. In this circular the Minister of Agriculture remarks that his attention has been called to the inconveniences caused by the presence of foreigners in Government establishments, and observes that, besides the dangers which may occur from the introduction of foreigners in agricultural establishments, there exists at the same time an undoubted inconvenience resulting from their permanent admission. He further states that these persons occupy positions which should be reserved for those of French nationality, or those who have been naturalised, and that such an inconvenience, were it the only one, should not be overlooked by his administration, and should be obviated at once, because in a democratic country as that of France, where access to all employments is free, but where competition is keen, the admittance into offices in the agricultural establishments must be widely open, but only to the French people. In conclusion, the Minister adds:—"I must impress upon you, therefore, not to admit into the ranks of employés in the department under your control, whatever his claims and however unassuming the employment may be, any person who is not a Frenchman by birth or by naturalisation, and I beg that you will inform me as speedily as possible of the steps which you have taken for the carrying out of my instructions."

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

EXPERT EVIDENCE.—*continued.*

Dr. C. R. A. WRIGHT, sworn. Examined by Mr. Lawson.

You are a Doctor of Natural Science of the University of London, Fellow of the Royal Society, and Professor of Chemistry at St. Mary's Hospital and Medical Schools?—I am.

Have you given attention to the chemistry of manganese? Yes, for many years.

With reference to the matters in this case?—Especially.

Did you hear Professor Dewar's evidence?—Yes.

Speaking generally, do you confirm that?—Yes.

Upon the point which I understood Professor Dewar to state, that the more water was present the more efficacious peroxide of manganese was?—The result of my experiments was to show that the more water there was present in peroxides, the more effective it was in removing iron from sulphate of alumina.

Do you confirm what Professor Dewar said with regard to the action of the lower oxides?—Yes.

You yourself have, I think, experimented with regard to the action of bases generally?—And as combined with peroxide of manganese.

Mr. Aston: As to what?—When combined with peroxide of manganese in the form of manganites.

As to what?—I say that bases, when combined with peroxide of manganese in the form of manganites, will be highly efficacious in removing iron from sulphate of alumina.

Mr. Lawson: I do not think we have this actually on the notes, though it has been mentioned in my friend's opening. Will you tell his Lordship what the difference is between hydrated compounds and other compounds?—A hydrated compound differs from an anhydrous one in that it contains additional elements in the form of oxygen and hydrogen in the proportions to produce water. The result of such addition produces in many instances a most profound alteration in the character of the body. Now take such a substance as charcoal. When that is compounded with the elements hydrogen and oxygen in the proportions to form water, you get compounds of which sugar may be taken or starch may be taken. Take such substances as starch——

Stopping you there, let me ask you this—would sugar be a hydrate?—A hydrate of carbon.

Should I be right in saying that charcoal and water contain the same elements as sugar?—Yes, they contain the same elements, but if you take charcoal and water th then simply mixed not combined.

There is a difference between mixing water with stance and the combination of the substance with w as to form a hydrate?—Yes.

With regard to the difference I suggested just now there rather a marked instance of that in connectio what you mentioned just now in carbonic oxide?—Y lower oxide is a gas which is poisonous, and which with a blue flame; the blue flame you see burning at of a coke fire is that gas burning. When carbonic made to unite with water you get what is fairly te hydrate, or a substance which is different *toto celo* from of the constituents—a terribly powerful acid known as acid.

Are there various hydrates of one substance?—Freq

Do these contain varying proportions of the el forming water?—Yes, compared with the standard of other substances with which the water is combine

Have you made any experiments with regard to t tive efficiency of samples of hydrated oxide of man I have.

Will you tell his Lordship what these experiment Have you your notes in writing?—I have my lab note-book with me, but I have no other document.

Will you tell his Lordship how you prepared the h oxide of manganese in these experiments?—One sp was prepared by taking permanganate of potash disse water, and adding nitric acid to the solution and w According to the temperature which was applied, so sulting peroxide contained more or less combined wat higher the temperature the less the water. Another sp was prepared by taking—I forget whether it was chl manganese or sulphate, but at any rate a soluble salt ganese—and adding to that manganate of soda, ar passing chlorine into the mixture. The result of tha precipitate the peroxide of manganese by a perfect known process. The substance so obtained, if the sol cold, contains more water associated with the ma than it does if the solution is hot. Another specime pared was made by taking solution of sulphate of ma and the salt of permanganate of potash and passing into the second so as to keep the permanganic always in excess. That is important, because if you attend to that proportion you get a lower oxide as protoxide.

I think you used the term hydrogen associated. mean hydrogen associated as a mixture or in combina In combination.

Did you try the effect of that in removing the iron I did.

With what result?—Speaking generally, the more as water was present the more highly hydrated the ma peroxide was, or, as I should prefer to call it, th effective it was.

Did you prepare any specimens of anhydrous per manganese?—Yes.

In what way?—One specimen by heating nitrate ganese for some hours to a temperature of betwe and 170° C.

Mr. Aston: What would that be about (Fahren Roughly speaking, about 340 degrees or 350 degr tween 300 degrees and 400 degrees.

How many hours?—I made several specimens; so heated for four hours and some for longer periods; n a larger mass would require a longer time.

Mr. Lawson: Did you try the effect of that speci did. I tried several specimens made in the same practically they were all inoperative.

Mr. Aston: Tell him how much iron was throw My Lord will decide whether they were operative or tive?—In one experiment there was absolutely none down.

Give me the exact composition of the anhydrous and what you tried it with?—The exact composition anhydrous peroxide was $Mn\ O_2$, pure and simple.

Did you make it.

Mr. Justice Kekewich: You are not yet cross-ex Mr. Aston. A question interposed was not out of o it must not be a series.

Mr. Lawson: I thought Dr. Wright had told us had made it, and the temperatures he had used.

Which of those was it? How many specimen hydrous peroxide have you made?—I have made fi at different times.

urself to one at present?—The one I referred to
le six months ago.
that made?—By heating nitrate of manganese to
re of between 160° and 170° Centigrade.
please say Fahrenheit, because we have had
lse in Fahrenheit?—I am so accustomed to think
e that I cannot calculate it in Fahrenheit with-

be over 300° Fahrenheit?—Yes.
d operate upon an aluminous solution containing
lution of sulphate of alumina prepared from
containing a quantity of iron which was equiva-
er cent. of peroxide of iron per thousand of
alumina, or otherwise ·4 per cent.
lt did you obtain from that in throwing down
lutely no iron was removed from that particular
g the sample in the proportion stated in Spence's
, namely, 6 parts of anhydrous peroxide to 100
of alumina.
ver try any other experiments with anhydrous
A number.
ordship another one.
: Would the witness give the quantity of alum
ed upon by the quantity of nitrate—I mean the
?—The proportions stated in Spence's specifica-
y, 6 of the first to 100 of the second.
son: Now, take another experiment with an-
oxide?—I am speaking now from recollection,
eriment, which I think was the most successful
nade, was this. I took five times the quantity
uired by the specification, that would be 30 parts
o 100 of the second.
ou prepare that?—In the same way as the other.
duplicate specimens prepared at different times.
imes the time required by the specification, and I
ur or five or a very small percentage of the iron

olution one which you operated as strong in iron
?—As nearly as possible. One was ·42 and the
40 per cent.
ry any other experiments with the anhydrous
Yes, I prepared a sample of anhydrous peroxide
strong solution of manganese nitrate, containing
s case, and adding to it chlorate of potassium. I
t substance, and I tested it, or rather I tested
of alumina containing iron with it, and in exactly
ay as in the other experiments, using the sub-
proportions required in Spence's specification of
oo parts. I removed under 10 per cent. of the
k the exact quantity was 7½, a quantity which
lerable.
used the hydrated oxides which you prepared,
e result as to the iron removed there?—Those
fully hydrated removed 98 per cent. and upwards
leaving 1 or 20 hundredths of the original quan-
Those that were not so fully hydrated removed
cent., leaving a rather larger quantity. Weldon
ted and removed 99 per cent.
ive a reason for the greater action of this Weldon
pared with the almost infinitesimal action of the
eroxide?—Certainly.
tell his Lordship what that is?—Anhydrous per-
pure state I found to be perfectly inoperative,
ydrated, that is combined with water, or if it be
ith other bases, excluding iron, it will act with
ous solution of the sulphate of alumina, so that
e which is combined and the iron in the sulphate
change places. You have a manganite of some
hydrogen to begin with; the iron in solution of
or hydrogen change places. The iron is con-
a compound of manganite and iron, which is
the sulphate of alumina solution, and is therefore
m the solution.
ve anhydrous peroxide heated to some tempera-
h is spoken of by some of the defendants'
what is the effect?—I have experimented with
ecimens of anhydrous peroxide and nearly
peroxide in the form of pyrolusite, and other
erals, and I found that none of these can be
temperature exceeding about 300° C.—and in
nces a lower temperature suffices without losing
combined oxygen, and so forming lower oxides.
nake any experiments upon manganese ore with
traction from salts of alumina?—Yes, several.
tell his Lordship what those experiments were?—I use two varieties of manganese ore, one an exceedingly pure one and one somewhat less pure.

Will you begin, first of all, with the less pure one, and tell his Lordship what percentage there was in that?—A trifle under 65—64·6.

What experiments did you make with that ore; first of all state it to his Lordship generally?—The ore was a specimen which I had had in my own possession for some twenty years. It was derived from a heap of several hundreds of tons of manganese ore which was used in an alkali works, where I was then engaged as chemist. Therefore I took the specimen as being the actual article used for the production of the chlorine. This specimen which I had had in my possession was in lumps about the size of hazel-nuts, perhaps. The first thing I did was to reduce those to a rough ground-powder, then to grind that finer and finer, to reduce it to as fine a state of division as was practicable, using ultimately an agate mortar, so that this was ground up to an extremely fine powder. I then weighed the quantity of this material, which represented 6 parts actual $Mn\ O_2$. That would represent a larger amount of the ore. The ore only contained 65 per cent. I took such quantity of the material as represented 6 parts of actual $Mn\ O_2$, and treated that with such a quantity of the sulphate of alumina solution as contained 100 parts of 0·4 of iron.

With what result?—A proportion of the iron was removed, in round figures, amounting to one-half.

Did you try that with a larger quantity than there is in the specification?—Considerably so in every instance.

Just give his Lordship one instance in which you tried a larger quantity?—In one experiment five times the usual quantity was used. That made 30 parts instead of 6 parts to 100 parts of sulphate of alumina.

What did you remove then?—I made so many experiments that it is rather difficult for me to say.

Had you notes made at that time which you can now refer to for the purpose of refreshing your memory?—I have them tabulated with a table at the end.

Mr. Justice Kekewich: Do not read us out your notes now that we have your evidence in another form; but, having looked at the note to refresh your memory, tell us what the result is?—Five times the quantity specified removed 52 per cent. of the iron that was originally present, or, in round figures, one-half.

Mr. Lawson: Were there or not any more oxides there?—Yes, there were.

Did you make another experiment with that ore?—I did.

What was that?—I heated it to redness, so as to drive off a considerable amount of the oxygen of the peroxide which was present in it originally.

Would the effect of the treatment be to produce lower oxides?—It would. I tested the action of that on the sulphate of alumina solution, and it was more effective than the original body, to such an extent that, using five times the quantity specified in the specification, I removed 99 per cent. of the iron. In fact, using five times the quantity, that particular specimen acted nearly as well as Weldon mud.

Do you attribute any difference in the action to the fact that you heated it?—Certainly. By heating I produced a larger quantity of the manganite of manganese which I believe to be the effective agent in such cases.

Did you try another experiment with the same ore?—Yes.

What was that?—The material which was used in five times the prescribed quantity removed 52 per cent. and 99 per cent. after being heated to redness. It was treated in this way. It was heated to redness, and then the residue was moistened with nitric acid, and heated again to a temperature little short of 200° The effect of the nitric acid in such a case is to oxidise up again the lower oxide of manganese which had been formed by the previous treatment. I found that the product obtained ultimately was less effective than the substance before this further treatment with nitric acid.

What proportion of iron was used?—By using five times the quantity specified in Spence's specification, 66 per cent. of the iron was removed.

To what do you attribute the facts that that proposition was only 66 per cent., whereas the other experiment, after you heated it to redness, was 99 per cent.?—To the fact that a large proportion of the lower oxide of manganese had become reoxidised, and formed peroxide.

So that in the last specification there was less lower oxide?—Yes, quite so.

You tried an experiment, I think you said, with another specimen of native ore?—I did.

What did it contain?—This was a selected specimen of well crystallised pyrolusite, and contained either 86 or 88 per cent.—I forgot which—of pure peroxide. It contained no foreign materials whatever, with the exception of a very faint trace of iron, and a little silica, and some combined water.

Did you try that in the quantity mentioned in the specification?—I did; but I found it acted rather feebly, and to get comparative numbers, I used four times the quantity; using four times the quantity I got 22 per cent. of the iron removed.

Did you try another experiment with the same ore subsequently?—I did.

What was that?—It was heated to redness, and then tested again in exactly the same way as the previous specimen, using also four times the normal quantity, and now its power of removing iron was a little increased, but not so much as the others. It was removed 26 instead of 22 per cent.—not much difference, but just that amount.

Did you make a further experiment in the same ore?—I did. After heating to redness it was treated with nitric acid to reoxidise it, but in this instance the result was to slightly increase its power of removing iron rather than to diminish it. The difference, however, was not very marked—33 per cent. instead of 56.

I think you said you tried pure peroxide———

Mr. Aston: I understand you to say that in the last experiment you heated it to redness?—In the last experiment this powdered pyrolusite was heated to redness, and subsequently moistened with nitric acid and again heated, so that in the last experiment the lower oxide had been partly peroxidised.

Was the second heating also to redness?—No. If I had heated it to redness the second time, I should have destroyed the effect I produced.

Mr. Lawson: You tried the experiment with pure peroxide obtained from nitrate of manganese, I think you said?—Yes.

And the result, I think you said, was nothing, or practically nothing?—The result was practically nothing. In one instance absolutely nothing.

That was using the normal quantity—the quantity in the specification?—Yes.

Did you try an experiment with that heated to redness?—I did.

With what effect?—A specimen which removed absolutely no iron when used in the normal proportion after it had been heated to redness was found, still used in the normal proportion, to remove 80 per cent. of iron. It became a little more effective—not much—but still perceptibly more.

Did you try it again with nitric acid?—I did after igniting it, and moistened the residue with nitric acid, and heating it again to 200°. It then possessed the power of removing 4 per cent. of iron, so that in this case the treatment with nitric had reduced the power of removing iron.

Did you try experiments in the lower oxides?—Yes.

What we have called the intermediate oxides?—Yes.

With what result?—The substances which contained less oxygen than Mn $O_2$, but more than Mn O, are practically somewhat numerous, although only two definite compounds are described in the books. But all these substances that I have had in my hands—and they have been several specimens—invariably removed some iron from the solution, and they also invariably put some manganese into the solution.

What is the conclusion to which you as a chemist have come to with regard to the relative efficiency of the hydrated and the anhydrous specimens?—The hydrated specimens act effectively, more so the more water is present. Absolutely the anhydrous specimens are either absolutely, or at any rate practically inoperative, and the intermediate ones act intermediately.

When an anhydrous peroxide is present with the lower oxide, what is the result?—It acts more or less according to its nature.

Mr. Justice Kekewich: You say that the hydrated specimens act effectively?—Yes.

The anhydrous specimens do not act effectively?—They do not act effectively at all.

I understand you to say that the intermediate specimens have intermediate effects?—I mean that the intermediate oxides act intermediately between the highly effective and the inoperative, that is partially.

So I understand, but do they do so in proportion as they are hydrated or anhydrous, so that there is a regular succession of success or defect. There is a regular succession. If you take a certain specimen of hydrated oxide, and you partially dry it so as to drive off a little of the combined water, then the residue is less active, and if you drive off more water, it comes less active still.

I only wanted to see that it is quite clear that you mean there is a regular progress of either success or failure?—Yes, my Lord, there is.

Mr. Lawson: What is the ordinary proportion of peroxide of manganese in the ordinary manganese?—There are several varieties, but the highest run up to 70 per cent.

Is that the lowest ore in the market?—Lower class ores are in the market, but they do not command as high a price.

If any person sold you peroxide of manganese, would you use any of the ores containing a low proportion of peroxide of manganese?—I think not, because such ores would necessarily contain other impurities which might render the sulphate of alumina unsaleable.

Is not it a fact that the common ore contains about 70 per cent.?—Yes.

You have read Knyaston's specification and Spence's specification?—Yes, I have.

Reading Spence's specification, what would the words "peroxide of manganese" convey to your mind as a chemist?

Mr. Aston: Is not that construction for your Lordship?

Mr. Justice Kekewich: I think not.

The Witness: Do you mean without any context.

Mr. Justice Kekewich: I think I am entitled to the assistance of experts as to the meaning of that particular term of art.

Mr. Lawson: Take Spence's complete specification, page 2, line 14, "We add to the abovenamed solution of peroxide of manganese," what would that convey to your mind?—Taking that substance without the subsequent sentence——

Mr. Justice Kekewich: The duty of constructing the sentence, however difficult, is cast upon me. All you are entitled to tell us, and I shall be very glad if you will tell us, is this, what does the particular term, as a term of your art, mean.

Mr. Lawson: If you were asked as a chemist to say what you would understand by this. "We add to the abovenamed solution peroxide of manganese in the proportion of 6 parts by weight of dry peroxide of manganese to every 100 parts by weight of dry sulphate of alumina cake." What would you understand?

Mr. Aston: You must go on; that is the middle of a sentence, "such peroxide of manganese we form artificially."

Mr. Lawson: Taking first of all the words, "peroxide of manganese," and stopping there, would peroxide of manganese convey to you anhydrous or hydrated?—It would convey to my mind the notion that the native ore was to be used, if taken without the context.

Reading it with with the context, "such peroxide of manganese we form artificially in a mode similar to the production of Weldon Mud"?—The word "artificially" would render it impossible that the native ore should be meant.

Now take the claim "The use of manganese combined with peroxide, whether produced from lower oxides by oxidation or from manganic acid or permanganic acid or their salts, by deoxidation for the purpose of purifying solutions of sulphate or other salts of alumina." Reading that claim alone apart from the rest of the specification———

Mr. Aston: But is that right?

Mr. Lawson: That will be a question for my Lord. Reading that claim alone, apart from the rest of the specification, does that convey to you———

Mr. Aston: What does it convey?

Mr. Lawson: What does it convey?

Mr. Justice Kekewich: Mr. Aston, you do not let Mr. Lawson finish his sentence, and therefore I cannot tell whether what he was going to put in was objectionable or not.

Mr. Lawson: I was going to ask the Witness whether that conveys to him whether he must use hydrated peroxide?

Mr. Aston: I object: We must have the question, What does it convey?

Mr. Lawson: Then I will ask that.

What do these words convey to your mind as to the peroxide to be used?—Speaking as a chemist they would convey to my mind the idea that the manganese is to be combined with oxygen only; therefore there is nothing else present but manganese and oxygen, or substantially nothing else present.

Now I will go to the next words—manganic acid. I think it is common ground that manganic acid has never been isolated?—Yes.

Is it possible, according to your knowledge, to produce manganese combined with oxygen as peroxide from manganic

acid as distinguished from its salts?—No, it is not possible, because the original substance cannot be obtained.

Can you obtain manganese combined with oxygen as peroxide from manganic acid as distinguished from the salts of permanganic acid?—A solution of permanganic acid can be obtained, and therefore one can obtain peroxide of manganese from permanganic acid provided one is allowed to use the solution and not required to use the separate body.

Would that be a practical method of making peroxide of manganese?—I think not, because the preparation of the permanganic acid solution is troublesome and in some instances dangerous.

In Mr. Kynaston's specification, page 2, line 21, he says, "In my new process, now to be described, the agent used is the hydrate of peroxide of manganese or more correctly speaking, the maganite of hydrogen or other manganite as precipitated from solutions of manganese by any of the well-known means." Speaking as a chemist, is that or is it not the same as peroxide of manganese?—Hydrate of peroxide of manganese is certainly not the same thing as peroxide of manganese in the chemical sense.

Now, one question as to Spence's provisional specification, page 1. "Our invention consists in producing alum and other salts of alumina with but a very minute proportion of iron and of coloured organic impurity by digesting or acting upon their solutions with an oxide of manganese." What do you understand by the term "oxide of manganese"—an oxide of manganese?—As a chemist I understand an oxide of manganese to be one of several known bodies which contain manganese and oxygen, but which do not contain anything else.

Do you understand "an oxide of manganese" to include Weldon mud?—No.

Mr. Justice Kekewick: I should like to know why?

Mr. Lawson: Tell his Lordship why you say an oxide of manganese does not include Weldon mud?—Because I have already stated that I understand by the words "an oxide of manganese" a substance that contains manganese and oxygen only. Weldon mud contains other things besides, combined as one compound.

Are the other things contained in the Weldon mud or not essential to the success of the operation—the removal of iron?—You can take an oxide of manganese which will remove some iron. I have already mentioned an experiment to that effect.

What oxides are they?—Some of the intermediate oxides.

But if you take peroxide of manganese as being this oxide of manganese which is referred to in the provisional specification, will that be effectual by itself?—Certainly not.

You must have something else with it?—Yes.

What are the other things contained in the Weldon mud? The other things contained in the Weldon mud, when combined with peroxide of manganese, produce a highly effective product.

Mr. Aston: My Lord, ought I to go on cross-examining this witness now?

Mr. Justice Kekewich: Yes.

Mr. Aston: Your Lordship will not give me the same indulgence that you gave me with regard to Professor Dewar?

CROSS-EXAMINED BY MR. ASTON.

Now, Dr. Wright, are you acquainted with the nomenclature in common use among the alkali makers in Lancashire? I think so.

Is not it true that you call Weldon mud oxide of manganese? It is sometimes spoken of in that way.

It is a common term for it among practical users of it?—Precisely: just as they call carbonate of soda, soda. It is an elliptical phrase.

*(To be continued.)*

## SOCIETY OF CHEMICAL INDUSTRY.

NEWCASTLE SECTION.

RIDSDALE'S SIMPLIFIED CHROMOMETER FOR MODERATELY DEEP TINTS.

AT the meeting of the Newcastle section of the Society of Chemical Industry, Feb. 7, 1888, Mr. C. H. Ridsdale, F.I.C., F.C.S., read a short paper on the above. The apparatus is for the rapid comparisons of solutions of various depths of tint, with a standard yielding solutions of a similar tint, with a view to determining the quantity of the particular constituent present. Hence it can be used for any chromometric method, such as the estimation of *carbon* in all classes of steel, *copper* in wrought iron, pig iron, steel, ferromanganese, iron ores, etc. *Manganese* in steel, *ammonia* in water, etc., etc. It consists of three glass tubes of equal bore, graduated, and perforated at the bottom, the hole being covered by a disc of opal glass. Over these tubes slide three outer tubes, which can be held in any required position by grips. The columns of liquid to be compared are adjusted to any height by raising and lowering these outer tubes.

Mr. Ridsdale also read a paper on the—

DETERMINATION OF VANADIUM IN THE PRESENCE OF CHROMIUM, ALUMINIUM, AND PHOSPHORUS.

Investigations, he said, as to the constitution of basic converter slags had rendered an inquiry into the value of published methods imperative. The methods examined were:—

I. By precipitation as vanadate of ammonia from ammonia extract, or other alkaline solutions.

II. By precipitation as lead or barium salts, and subsequent decomposition by nitric and sulphuric acids.

III. By colorimetric methods.

IV. By titration with permanganate of potash and analogous methods.

V. By Lindemann's method of titration with ferrous sulphate.

The various difficulties and sources of error were noticed, and the fifth method shown to be at present the most useful and reliable. An outline for complete analysis, in conjunction with the last-named method, of converter slags, etc. was described, and there were also data furnished as to the effect of vanadium on the precipitation of phosphoric acid, whether as phosphomolybdate of ammonia, or ammonio-phosphate of magnesia, and on alumina and chromium sesquioxide.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

STILL are we without any specific bettering on the chemical market in this quarter. Sulphate of ammonia is certainly firmer than it was a week ago, and its negotiable price is higher; but the firmness is only comparative and there is an essential absence of briskness in the dealings registered, although the drop of a fortnight ago has been partially retrieved, it is true. At present no one pretends to forecast the immediate future of this section, and it may go up or go down equally without exciting surprise. The other sections remain about stationary as regards prices, and transactions have been marked by languor only. Makers of bichromates have been laying their heads together again towards a further adjustment of the Scotch position in the manufacture, which of late (as touching the rivalry of foreign makers, etc.), has shown itself to be by no means so satisfactory as could be wished, but the steps to be adopted, if any, are still unannounced. General prices current are:—Soda crystals 41s. net, Tyne; alum, in lumps, £5, less 2½ % Glasgow. Borax: English, refined, £31, and boracic acid, £46 net, Glasgow. Soda ash. 48/52° 1d., less 5 %, Tyne; Caustic soda, white, 76°, £8. 2s. 6d.; 70/72°, £6. 17s. 6d. to £7; 60/62°, £6; and cream, 60/62°, £5. 17s. 6d. to £6, less 2½ %, Liverpool. Bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net, Tyne. Refined alkali, 48/52°, 1⅛d., less 2½ %, Tyne. Saltcake, 21s. 6d., less 2½ %, f.o.r. Glasgow. Bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 %, f.o.r., Glasgow. Bichromate of potash, 4½d., and of soda, 3½d., less 5 % and 6 % to Scotch and English respectively; nitrate of soda, 9s. 6d.; chlorate of potash, 6d., less 5 %, any port; sulphate of ammonia, £12. 5s. to £12. 7s. 6d., f.o.b., Leith, Paraffin scale: 2½d. hard, soft 2d.; paraffin wax, 120° semi-refined 2$\frac{11}{16}$d. net.; paraffin spirit, 6d.; burning oil, 6d. to 6½d.; lubricating oil, 885°, £6. 10s. to £7. Sulphate of copper, £22 10s. Imports have included 624 tons copper ore, 4,998 tons iron ore, 1,200 tons chrome ore, 1,550 tons pyrites of copper, and three cargoes of sugar.

## THE LIVERPOOL MINERAL MARKET.

Manganese stocks remain practically unchanged, and no alteration in prices. Magnesite (containing 98 per cent. of carbonate of magnesia): Large arrivals have come to hand, and prices are easy at 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite (Irish Hill brand) is unaltered at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s Dolomite, 7s. 6d. per ton at the mines. French chalk: Arrivals have increased somewhat, but prices are firmer at 80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate) continue to be scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-stone: In good demand; specially selected lump, finest quality, £9 to £10s. 10s. Iron ore has much improved; Bilbao and Santander, 7s, 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 21s. c.i.f. Emerystone very scarce at £5. 5s. to £5s. 15s. for lump; and smalls, £5. Fluor and felspar quiet. Fullers' earth steady; 40s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda continue steady, and prices are unchanged. Tungsten metal at 2s. 6d. per lb. Tungsten alloy 2s. per lb. Chrome ore continues to improve in demand, and prices are stronger. Antimony ore, £10 to £15 for fair quality. Antimony metal, from £37. 10s. to £38. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Small, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s, Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powered (manufactured), £11 to £12. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8. to £8. 10s. Bitumen, finest packed, £35; original prime, £18 to £23; and good, £8.

## THE LIVERPOOL COLOUR MARKET.

Colours are quiet. Ochres: Oxfordshire £10, £12, £14, and £16, according to quality; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d.; Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto, for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## LIVERPOOL CHEMICAL MARKET.

There is little change to report in the market this week, prices remaining without material alteration. Caustic soda: 60 per cent. white, at £6; 60 per cent. cream, £6; 70 per cent. white, £7; 74 per cent., £7. 10s.; 76 per cent., £8 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda: There is little improvement at 9s. 6d. to 10s.; cargoes, 3d. to 6d. lower. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder, £7. 15s. to £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 21s. 6d. Bichromate of potash, 4¾d. Bichromate of soda, 3¾d. Carbonate of potash, £20: Chlorate of potash, 6½d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 26s. Chloride of barium, £9. Hydrate of barium. 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11; lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper easier at £21. 10s. to £22. Blanc fixe, £8. 10s. Manganese: Sulphate, £20; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic), 45s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 32s.; grey, 31s. Refined borax, £30. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc (solid), £18. Hyposulphite of soda, dry and white, £5. 15s. Pearl ash, 40s. to 42s. 6d.

## MISCELLANEOUS CHEMICAL MARKET.

The state of trade generally is far from satisfactory, and as a rule concessions in prices have to be made to induce business. Chlorate of potash is now more generally obtainable at price mentioned last week, and bleaching powder is said to be a shade weaker, though quotations are pretty generally maintained at £7. 10s. (rails).

Alkalies all round are without any important changes. Caustic potash and carbonate are selling freely in various qualities, and prices are without alteration. Sulphate of copper has a tendency to rise, owing to greater firmness in quotations for the metal. Lead and litharge are selling freely on the spot at full prices. For future deliveries slight concessions have been made. Nitrate and acetate of lead are very quiet. Brown acetate of lime, owing to smaller consumption and accumulation of stock, has been offered during the week at rather lower prices. Acetic acids are all round very low in value, and makers generally are short of orders.

Sulphocyanides are offering again at reduced rates, and the lower prices should bring these products into more general use. Prussiates of potash are still quiet, and prices do not move either way.

## THE ALKALI TRADE.

There is no new feature to report in this market. Alkalies, both carbonated and caustic, are still very inanimate, although a good business is being done in them. The new ammonia-soda processes do not seem to be possessing that confidence with the public that big prospective dividends should do; no doubt the gloomy outlook of the future has something to with it. Bleaching powder is in good demand, and a rise is expected for hardwood, owing to the constantly increasing difficulty of getting materials for staves.

## THE TAR PRODUCTS MARKET.

Benzol gets more and more into the mire, and what will be the end of all this speculative buying it is hard to foretell. Some large contracts have been let for tar, and it may be that some tar distillers have not reckoned on the future too carefully. We understand Manchester tar has been let at 24s. 6d. for two years, and how tar of that quality can be made to produce so much money is more than we can see. That produced from one station is, however, much better than that from the other two. 90's benzol is quoted at 3s. 6d. per gallon, but if any holder wished to sell he would have to take less than this. Carbolic acid (crude) still keeps its price. Anthracene is moving slowly upwards, and pitch, although in more demand, still remains at old prices.

## THE SULPHATE OF AMMONIA MARKET.

Last week prices were low, but as the week progressed it was seen that values were hardening, and on Monday last sulphate had reached £12, 7s. 6d. at Hull, and Beckton price was raised to £12. 15s. On Wednesday prices were further advanced to £12. 10s. Hull and £12. 7s. 6d. Leith, while London outside makes found an easy market at £12. 12s. 6d. Stocks are by no means heavy, and there is not much offering, so with the Continental Spring demand, which must come sooner or later, the prospects seem fairly good.

# New Companies.

ABERTHAW LIME COMPANY LIMITED.—Capital, £10,000 in £10 shares.

BRISTOL BREWERY, GEORGES & COMPANY LIMITED.—Capital, £300,000 in £10 shares.

CARBONISING SYNDICATE LIMITED.—Capital, £3,100 in £100 shares.

EUROPEAN AND AMERICAN MACHINE-MADE BOTTLE COMPANY LIMITED. Capital, £600,000 in £5 shares.

GALICIAN OIL PROSPECTING COMPANY LIMITED.—Capital, £30,000 in £1 shares.

MAYFIELD, COBB & CO. LIMITED (ELECTRICIANS, ETC.).—Capital, £20,000 in £5 shares.

NORWEGIAN ZINC COMPANY LIMITED.—Capital, £56,000 in £1 shares.

ST. NEOT'S PAPER MILL COMPANY LIMITED.—Capital, £30,000 in £5 shares.

TREGEAGLE TIN MINING COMPANY LIMITED.—Capital, £20,000 in £1 shares.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

J. H. RILEY & Co., Bury, engineers and machinists, as far as regards J. Downham.

VAUGHAN & Co., Birmingham, bottle opener manufacturers.

J. T., R. L., and J. H. CHANCE, Smethwick, Staffordshire, buyers and sellers of British plate-glass, under the style of the Birmingham Plate-Glass Company.

SEWARD & YOUNG, Gainsborough-road, Hackney Wick, London, colour, varnish, and printing ink manufacturers.

J. & T. KNOTT, Stockport, engineers and machinists.

CARTER BROS., Rochdale, engineers and millwrights, as far as regards S. Carter.

WALLIS, GIMSON & Co., Fenton, Staffordshire, earthenware manufacturers.

J. PRITCHARD & SON, West Bromwich, tube manufacturers.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

MARKUS, HARRIS, Fleetwood and Manchester, indiarubber manufacturerer.

OAKLEY, JAMES, Birmingham, druggist and drysalter.

PINDAR, JOHN, Bradford, late of Apperley Bridge, Yorkshire, sanitary engineer.

SHARPE, ALFRED, Huddersfield, leather currier.

### Adjudications.

OAKLEY, JAMES, Birmingham, druggist and drysalter.

MILLINGTON, JOHN (trading as E. Millington & Sons), Haughton, Lancashire, hat manufacturer.

SHARPE, ALFRED, Huddersfield, leather currier.

WATSON, LEWIS, and BIRKETT, JOSEPH, Cleckheaton, Yorkshire, curriers and leather dealers.

### First Meetings and Public Examinations.

SHIRT, GEORGE EDWARD, New Park-road, Brixton Hill, London, oil and colourman. Feb. 29, Bankruptcy Buildings, Portugal-street, Lincoln's Inn Fields. March 13, 34, Lincoln's Inn Fields.

MARKUS, HARRIS, Fleetwood and Manchester, indiarubber manufacturer. Feb. 29, Official Receiver's Office, Manchester. March 2, County Court Offices, Preston.

OAKLEY, JAMES, Birmingham, druggist and drysalter. Feb. 29, 25, Colmore-row, Birmingham. March 7, County Court, Birmingham.

PINDAR, JOHN, Bradford, late of Apperley Bridge, Yorkshire, sanitary engineer. March 1, Official Receiver's Chambers, Bradford. April 6, County Court, Bradford.

### Notices of Dividends.

FRENCH, JOHN (trading as J. French & Co.), Commercial-street and Montague-place, brass founder, engineer, and oil and grease merchant. Second and final dividend of 9d., any Wednesday or Thursday, 37, Upper Thames-street, London.

GEDDES, CHRISTOPHER (trading as the West Yorkshire Fire-Clay Company), Silkstone and Dodworth, Yorkshire, fire-clay goods manufacturer. First and final dividend of 11¼d., Feb. 27, 3, Eastgate, Barnsley.

HORNER, JAMES READ, Salterhebble, near Halifax, chemical manufacturer. First and final dividend of 2s. 0¾d., any day, Official Receiver's Offices, Halifax.

WINTERBURN, THOMAS, Bradford, dyer. First and final dividend of 2s. 3½d., any day, Trustee's Office, Market-street Chambers, Bradford.

# The Patent List.

*The following List has been compiled expressly for* THE CHEMICAL TRADE JOURNAL *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Alkaline Carbonates and Phenoloid Bodies.** W. W. Staveley. 2004 Feb. 10.

**Extracting Copper from Pyrites.**—(Complete Specification.) J. Perino. 2019. Feb. 10.

**Separating Metals from their Ores.** A. N. Mason. 2025. Feb. 10.

**Refrigerating Apparatus.**—(Complete Specification.) J. P. Lawrence. 2050. Feb. 10.

**Drying Substances by Air or Gases.** H. J. Peck. 2057. Feb. 10.

**Gas Lamps.** T. Fletcher and A. Clare. 2058. Feb. 10.

**Aluminium Salts.**—(Complete Specification.) J. Hauff. 2070. Feb. 10.

**Separating and Refining Metals.**—(Complete Specification). H. H. Lake. 2071. Feb. 11.

**Hydrocarbon Lamps.** J. T. Scholte. 2077. Feb. 11.

**Supplying Hot Air to Boiler Furnaces.** W. Schofield. 2078. Feb. 11.

**New Yellow, Red, and Blue Colouring Matters.** A. Studer and A. Liebmann. 2084. Feb. 11.

**Dynamometers.** J. G. Gilchrist. 2088. Feb. 11.

**Improvements in Dyeing Wool and Cotton.** F. Lee, J. Bradshaw, and F. Lee. 2093. Feb. 11.

**Illuminating Gas.** J. H. R. Dinsmore. 2096. Feb. 11.

**Fictitious Brandy.** H. de Soberon. 2099. Feb. 11.

**Supplying Lamps with Paraffin.** J. B. Cowdy and J. A. Samuels. 2101. Feb. 11.

**Maintaining Liquids at Boiling Temperature.** F. H. Wenham. 2102. Feb. 11.

**Preventing the Falsification of Cheques.**—(Complete Specification.) J. Y. Johnson. 2103. Feb. 11.

**Manufacture of Chlorine.** H. W. Deacon and F. Hurter. 2104. Feb. 11.

**Manufacture of Vapour.** J. J. R. Humes. 2111. Feb. 11.

**Vessels for Heating Fluids.**—(Complete Specification.) J. Lane. 2113. Feb. 11.

**Printing on Celluloid Substances.** A. Bensinger. 2122. Feb. 11.

**Pneumatic Separator for Granulated Materials.**—(Complete Specification.) H. Dietz. 2123. Feb. 11.

**Steam and Vacuum Pumps.** E. Hodgkin and P. E. Hodgkin. 2124. Feb. 11.

**Arc Lamps.** W. Rowbotham. 2125. Feb. 11.

**A Discharging Sewage Barge.** F. Jordan and C. R. Dickinson. 2131. Feb. 13.

**Raising Water to Top of Hills.** G. Blacker. 2132. Feb. 13.

**Extinguishers for Oil Lamps.** W. H. Pasley. 2142. Feb. 13.

**Apparatus for Drawing or Delivering Fluids.** G. Wood and W. J. Hall. 2144. Feb. 13.

**Gas Burners.**—(Complete Specification.) J. G. Hawkins and J. Barton. 2162. Feb. 13.

**Improved Joint for Pipes.**—(Complete Specification.) G. Wimpey. 2164. Feb. 13.

**Secondary Batteries.** R. N. Boyd. 2178. Feb. 13.

**Electric Lights.**—(Complete Specification.) N. Wheeler. 2179. Feb. 13.

**Metallic Compounds or Alloys.** J. Sinclair and J. P. Smith. 2182. Feb. 13.

**Petroleum Lamps.** W. Boggett. 2183. Feb. 13.

**Manufacture of Glass.** E. Story and R. Punshon. 2184. Feb. 14.

**Precipitating Sewage.** J. H. Barry. 2187. Feb. 14.

**Manufacturing White Pepper Corns.**—(Complete Specification.) A. Dunderdale. 2190. Feb. 14.

**Ovens for Baking Pottery Ware.** H. Aynsley and Co. 2206. Feb. 14.

**Strainer Plates for Pulp.** J. Scott. 2208. Feb. 14.

**Preventing Corrosion in Iron.** R. C. Wallace and R. D. Smillie. 2212. Feb. 14.

**Heating Revolving Cylinders.** R. Crawford. 2214. Feb. 14.

**Steam and Fluid Motor Engines.** G. W. Newall. 2215. Feb. 14.

**Tinea Cure.** A. Campbell. 2219. Feb. 14.

**Hot Air Motors.** C. Wells and J. B. Pallett. 2232. Feb. 14.

**Causticising Sodium Carbonate.** A. J. Lawson. 2236. Feb. 14.

**Glass Bottles.** W. B. Fitch. 2241. Feb. 14.

**Liquid Meters.** J. Claret. 2243. Feb. 14.

**Dynamo-electric Machines.**—(Complete Specification.) H. H. Lake. 2246. Feb. 14.

**Duplex Pumps.**—(Complete Specification.) O. Imray. 2252. Feb. 14.

**Thermo-electric Batteries.** H. Mestern. 2259. Feb. 14.

**Glass Hollow-ware Manufacture.** J. Tabrar. 2261. Feb. 14.

**Hydrocarbon Lamps.** M. Mackay. 2262. Feb. 15.

**Exhausting and Propelling Air.** J. Crighton, R. Crighton, and G. C. Peel. 2268. Feb. 15.

**Fans for Exhausting and Propelling Air.** J. Crighton, R. Crighton, and G. C. Peel. 2269. Feb. 15.

**Fireproof Ceilings.** J. Bassett and F. N. Seydé. 2272. Feb. 15.

**Ventilating Lamps.** H. T. Johnson. 2273. Feb. 15.

**Boiler Feeding Apparatus.** W. Schmidt. 2278. Feb. 15.

**Manufacture of Glass Bottles.** D. Rylands and B. Stoner. 2280. Feb. 15.

**Bye-products from Coal.** F. Rylance, W. Rylance, and J. Rylance. 2282. Feb. 15.

**Preserving Hops.** L. A. Groth. 2287. Feb. 15.

**Decorative Material for Walls.** H. L. Storey and J. H. Storey. 2288. Feb. 15.

**Compressing Substances.** T. Messenger. 2293. Feb. 15.

**Improved Joints for Piping.** J. R. Leaver. 2296. Feb. 15.

**Soap Soluble in Sea Water.** O. H. von. Wilke. 2306. Feb. 15.

**Dynamo-electric Machines.**—(Complete Specification.) C. Coerper. 2308. Feb. 15.

**Manufacture of Chlorine.** H. W. Deacon and F. Hurter. 2311. Feb 15.

**Manufacture of Bottles.** J. B. Adams. 2318. Feb. 16.

**Slow Combustion Gas Fire.** D. H. Saul. 2324. Feb. 16.

**Preventing Falsification of Cheques.** A. Martini. 2326. Feb. 16.

**Preserving Fermentable Substances.** E. M. Lévy, commonly called E. Samson, and G. E. Millaud. 2327. Feb. 16.

**Joining and Locking Pipes.** C. J. Howe. 2333. Feb. 16.

**Utilisation of Explosive Force.** W. D. Scott-Moncrieff. 2336. Feb. 16.

**Stone-Breaking Machines.** S. Mason. 2340. Feb. 16.

**Apparatus for Dyeing.** W. Mycock. 2341. Feb. 16.

**Furnace Boilers.** C. J. Henderson. 2342. Feb. 16.

**Drying Oils and Varnishes.** W. S. Somers. 2344. Feb. 16.

**Water-Heating Apparatus.** W. J. Payne. 2351. Feb. 16.

**Self-Generating Gas Burners.** R. Wallwork and A. Collings. 2352. Feb. 16.

**Tanning.**—(Complete Specification.) W. Zahn. 2353. Feb. 16.

**Cooling Fluids.**—(Complete Specification.) W. J. S. Pearce. 2361. Feb. 16.

**Drying Tea.** D. H. Dade. 2362. Feb. 16.

**Cooking and Lighting Lamps.** F. H. Lenders. 2364. Feb. 16.

**Cement.** G. J. Snelus, J. C. Swan, and H. Smith. 2366. Feb. 16.

**Separating Matters by Dialysis.** J. Marks. 2367. Feb. 16.

**Secondary Batteries.** M. Bailey and J. Warner. 2368. Feb. 16.

**Gas Burners.** R. A. Lee. 2370. Feb. 16.

**Production of Beer, Maltose, etc.** C. D. Abel. 2672. Feb. 16.

**Gas Lamps.**—(Complete Specification.) W. Stern. 2373. Feb. 16.

**Carburetting Gas.** W. Brown. 2378. Feb. 16.

# PRICES CURRENT.

[THURSDAY, Feb. 23, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 9 | 3 |
| ,, Glacial | per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3¾ |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 5 | 0 |
| ,, ( ,, 150°) | ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 7 |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3⅛ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 0 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 15 | 0 |
| ,, ,, (grey), Hull | ,, | 12 | 10 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8½ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 8 | 0 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 8 | 9 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, | per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 6 |
| ,, 50/90 ,, | ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 3 |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 4 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 78 | 0 | 0 |
| ,, Sulphate | ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 70 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 16 | 5 | 0 |
| ,, Litharge Flake, ex ship | ,, | 16 | 10 | 0 |
| ,, Acetate (white) | ,, | 27 | 15 | 0 |
| ,, ,, (brown) | ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 0 | 0 |
| ,, Nitrate | ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 12 | 6 |
| ,, ,, (grey) | ,, | 13 | 15 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 18 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent | ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 9 |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 2 | 6 |
| Cotton-seed | per ton | 20 | 10 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 6¾ |
| ,, American | ,, | 0 | 0 | 7½ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 6 |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 6 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % | per ton | 9 | 15 | 0 |
| ,, Muriate, 80 % | ,, | 8 | 5 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 8 1/16 |
| ,, Nitrate | ,, | 0 | 2 | 7½ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 4 | 0 | 0 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) | ,, | 2 | 6 | 3 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 20 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 31 | 0 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 8 | 10 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 12 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 17 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 17 | 6 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 15 | 0 |
| ,, Bicarbonate | ,, | 5 | 10 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 4½ |
| ,, Nitrite, 98% | per ton | 28 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5⅜ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 12 | 6 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 5 | 0 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 13 | 10½ |
| ,, Cane | ,, | 0 | 18 | 3 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 8 |
| ,, Barium | ,, | 0 | 0 | 5½ |
| ,, Copper, 60% | ,, | 0 | 0 | 9 |
| Sulphur (Flowers) | per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 0 | 0 |
| Tallow | ,, | 26 | 15 | 0 |
| Tin (metal) | ,, | 160 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) | per ton | 19 | 7 | 6 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, March 3, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Our Registered Telegraphic Address is—

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The yearly Subscription, commencing at any date, to the *Chemical Trade Journal*,—payable in advance,—including postage to any part of the world, is 10s. 6d. Readers will oblige by making their remittances for subscriptions by Postal or Post Office Order, crossed. The charge for a Postal Order for 10s. 6d. is one penny.

Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

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## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

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## SPECIAL NOTICE.

IT is our intention at an early date to introduce a new feature in the pages of the *Chemical Trade Journal*—one that we feel sure will commend itself to our numerous circle of readers, seeing that nothing of the kind has ever been attempted before in connection with the Chemical and Allied Industries.

We propose to issue a weekly summary of the chemicals and articles of a kindred nature exported from and imported to the principal seaports in the United Kingdom, commencing in the first instance with the five following ports, viz., London, Liverpool, Glasgow, Hull (with the Humber ports), and Newcastle-on-Tyne.

Those of our readers who are acquainted with the sources of information available for the purpose, will not need to be told of the vast amount of labour, not to mention expense, involved in the proposed compilation, but believing as we do that the information will be of the greatest practical value to our subscribers, we shall spare no pains in compiling and presenting in our pages a handy and reliable record from week to week.

Any suggestions that our subscribers may have to offer in connection with this matter will be gladly received and duly considered.

## THE RIO TINTO DIFFICULTY.

WE have received a communication from our correspondent in Madrid informing us that the Government has seriously taken up the question of the open air calcination of pyrites in the valley of the Tinto. The devastations resulting from the sulphurous fumes evolved during the process are said to be much on the increase, and the Government has come somewhat tardily to the determination that this source of air pollution and the consequent public discontent must come to an end.

We ought not, however, to be too hard upon these pollutors of the Spanish atmosphere, as we have in this country some things to remind us of our own shortcomings, which in a few words may be described as dry copper pollutions and glasswork pollutions, both of which are sufficiently striking in certain districts that they need not call for any special mention here.

In the article copied into these columns on the 18th ult. from the *Investors' Guardian* the following words occur:—"Probably 1,000,000 tons of pyrites are now treated in this manner in these districts, and if so, 450,000 tons of sulphur are annually vomited into the air in the form of sulphurous acid. As with 5 per cent. of sulphuric acid air becomes unfit for respiration and absolutely prejudicial to health, it follows that about 500,000,000 cubic feet of air become infected and unfit for breathing in one single year."

Five hundred million cubic feet of air may to some of our readers appear a large quantity, but we shall endeavour to show that these figures are as a mere drop in the ocean compared with the pollution actually caused. We do not know from what source our contemporary obtained its figures, but they are incorrect in nearly every particular. Five per cent. is quoted as being the amount of sulphurous acid which, when mingled with air, renders it "unfit for breathing," and no doubt a mixture of this strength is injurious. But it is a fact that a much less percentage is also terribly injurious to crops, and even to animal life itself. M. Hirt has put upon record that $\frac{1}{2}$ per cent. of sulphurous acid present in the air makes respiration inconvenient. There is no doubt this is so, and, we would add, very inconvenient; but M.

Ogata has also told us that 0·04 per cent. is very bad, and that mice will only live about three hours in a mixture of sulphurous acid and air containing 0·06 per cent. of the former gas.

Taking these figures as a basis, it will be seen that a very much larger quantity of air than five hundred million cubic feet must be annually rendered unfit for respiration. But we need not argue upon such small apparent quantities; it is very well known that the escaping gases from a set of good working oil of vitriol chambers averages about one grain of sulphurous acid per cubic foot, roughly let us call it 0·1 per cent. as being on the safe side; or in other words a grain of sulphurous acid would render one cubic foot of air irrespirable, as we all know that the gases from the exit from a vitriol chamber are not particularly salubrious.

The one million tons of pyrites said to be calcined per annum will produce about 900,000 tons of sulphurous acid, which, multiplied by 2,240 and again by 7,000, gives the number of grains of sulphurous acid let loose into the Seville district in one year. If now we reckon that one grain of sulphur renders one cubic foot of air injurious to health and vegetation, by following out the calculation our readers will see that the number of cubic feet contaminated annually amounts to

14,112,000,000,000,

or nearly fifteen millions of millions of cubic feet, or a volume requiring a flue 200 feet square, the contents being supposed to move at a rate of 10 feet per second continuously, night and day, during the whole year.

We recommend this calculation to the notice of our Madrid correspondent, from whom we learn that a decree has already been signed, forbidding all open air calcinations in the Tinto valley after a period of three years has elapsed. How this will affect the future value of copper is not yet apparent, as most probably the market of a few years to come will be ruled by the output of those mines now idle, but for which active preparations are being made for starting. Another question forces itself upon our notice in connection with this subject. "What is to become of the sulphur of these calcinations if it is not to be allowed to escape into the open air?" This may be the commencement of a movement which will again shake the alkali trade to its foundation, even if it be not the ultimate cause of its fall. Cheaper sulphur is not the greatest boon to the alkali trade, as it is quite possible such a gift may enable others to commence the manufacture of bleaching powder, throwing away the saltcake as so much alkali waste.

## THE HARGREAVES THERMO-MOTOR.

OWING to want of space in our last number we were obliged to defer our reply to Professor Smith's letter until this week. Our readers will see we could not be expected to know the conditions under which the Professor wrote his letters to the *Engineer*, neither could we assume any carelessness on his part, with regard to what he was writing about before sending his comments for publication in a scientific journal.

A workman is judged by the excellence or otherwise of his work, and a teacher of science by the degree of accuracy and clearness with which he expounds scientific truths, and the Professor must admit that our complaints, written and in print actually before his second letter appeared were perfectly legitimate. We have no personal feeling or interest whatsoever in the matter, and Professor Smith has our most sincere sympathy in the affliction to which he ascribes the cause of his mistake; but appeals *ad misericordium* are out of place in discussing scientific facts.

In reading Professor Smith's letter to our contemporary, we were struck with the vague and indistinct method in which he had treated his subjects, and in the last week's *Engineer* Mr. Hargreaves complains of the same deficiency, which prevents him from knowing what he has to reply to. The inferred suggestion that the air should be heated previous to being drawn through the air-pump is evidently quite contrary to what a knowledge of thermo-dynamics would lead anyone to practise, and we were half tempted to comment on this also, but being limited by the space at our disposal, we confined our observations to the chemical principles involved. Professor Hele Shaw has, however, treated on this matter in a letter to the *Engineer*, and therefore further reference to it in our columns is unnecessary.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

EXPERT EVIDENCE.—*continued.*

You were asked the meaning of this claiming clause. First of all you were asked the meaning of peroxide in page 2, line 14, and you very properly said that reading the context, you would imagine that peroxide to mean a hydrated peroxide such as is found in Weldon mud?—Pardon me, I said that I understood it meant a substance formed artificially, which therefore excluded the natural substance.

"Such peroxide of manganese we form artificially in a mode similar to the production of Weldon mud." Did you not hear that?—Yes.

Does not such peroxide refer to the peroxide spoken of in line 14?—Certainly.

Is not that peroxide, spoken of in line 14, referred to more particularly when its composition is specified in line 18—is it not referred to as Weldon mud?—Yes, or a substance similarly formed.

That means analogous to Weldon mud?—Yes.

It is not a fact that that is the only formation or the only mode of production given by the patentee as to the form of peroxide of manganese which he proposes to use?—I think not, because he distinctly says that he does not confine himself to that.

Now, Dr. Wright, I have had the pleasure of asking you a question before, and I will ask you to-day, as I have asked you on a former occasion, to be good enough to answer my question?—I say I think not.

Is it not a fact that that is the only method of forming the peroxide which he describes in his specification?—Including the patent claim, that is not the only method.

I am asking you whether that is not the only precise direction that he gives you in the specification, my Lord will see?—I say that if you include in the specification the claim it is not the only method.

Then I will exclude the claim. Excluding the claim, is not the only direction given by the patentee a direction which would lead you to the production and use of anhydrous peroxide?—Will you repeat the question?

I ought to have said hydrated peroxide. That is a slip of the tongue; you knew that well enough.

Mr. Justice Kekewich: I did not, Mr. Aston.

Mr. Aston: Is not the only substance whose composition and whose method of forming is described in the patentee's specification the hydrated peroxide found in the Weldon mud?—Yes, the only method described, not the only method referred to.

Do you not believe that anybody coming to this specification would try that first?—Yes, I suppose he would.

And if he tried it it would answer?—No doubt.

The patentee says: "We would have it understood that we do not confine ourselves to the above specified quantities nor to the precise mode specified for the application of our invention, nor do we confine ourselves to the use of the aforesaid 'Weldon mud.'" So far there are no directions, are there, as to using any other specified form but the Weldon mud?—Down to that line, none.

He then goes on, "Having thus described and ascertained the nature of our said invention, and the manner in which the same is to be performed." He has told you the manner in which it has to be performed, has he not?—Yes.

And you have told me what that was so far. Then he goes on, "We desire it to be understood that we claim as secured to us under the above in part recited letters patent, the use of manganese with oxygen as peroxide, whether produced from lower oxides by oxidisation." That is as in the Weldon mud. They would be produced by lower oxides by oxidisation if you completely oxidised?—No, with hydrated oxide produced for a lower hydrated oxide.

Whatever it is it is a peroxide in the state in which it would be if treated in the Weldon mud fashion?—Yes.

That then would be a peroxide such as he referred to above in line 14, and produced from the lower oxides in the way that he tells you from line 14 down to line 20?—It would be a peroxide combined with something else.

But at all events that is what he has referred to?—Yes.

"Or for manganic acid or permanganic acid or their salts, by deoxidisation." Would not all those be artificial peroxides?—Yes, those that were capable of being formed in that way.

All that he claims in the claiming clause are artificial peroxides—those which are capable of being formed?—No, I think the claims are not limited to that, because they are formed by oxidation in nature.

You say that the lower oxide is converted into peroxide in the natural product?—I believe that is the way in which the natural product is actually deposited.

How?—Because there the process is going on now at the bottom of the sea. The nodules of peroxide of manganese were fished up in the "Challenger" expedition.

You say as to the use of manganese, combined in oxygen, as peroxide, that when the word "produced" is referred to by their patentee, he means naturally produced. Do you?—I think the claim does not exclude it, and therefore it includes it.

That is not the point. I ask you whether, applying your common sense to it———

Mr. Justice Kekewich: Do you think, Mr. Aston, you are quite on that part of the case which belongs to Dr. Wright?

Mr. Aston: I do not think I am, my Lord.

Now, I will assume that the patentee has told you that the peroxide that he uses is an artificial peroxide. Is that so?—Yes.

And as far as his directions go as to the manner in which it is to be performed, he has spoken of nothing but an artificial peroxide?—Pardon me, he qualified that statement afterwards by saying that he does not confine himself to it.

Mr. Justice Kekewich: Really, Mr. Aston, this is too much a question of construction.

Mr. Aston: Then he says, "Nor do we confine ourselves to the use of the aforesaid Weldon mud?—Then I understand that he uses or may wish to use something else.

That fortunately will not be for you. Would any persons desirous to throw down or remove particles of iron from sulphate of alumina solution be likely to fail if they worked according to that specification, beginning where the patentee tells you to begin?—I presume you mean to dissolve iron?

Yes.—If he carried out the directions that are given up to line 37 or 38, he would certainly succeed.

Where is it you think he might begin to go wrong—by reading in these words: "Nor do we confine ourselves to the use of the aforesaid Weldon mud." That is the first place he might go wrong in, is it?—Very distinctly.

Is that the first place?—I think so.

Down to there, you think, he might go all right?

Mr. Justice Kekewich: What I understand Dr. Wright to say is this. If the specification points to the use of anhydrous peroxide, it is not for me (using Dr. Wright's words) to say "then he would certainly go wrong." Is not that so?

Mr. Aston: But if it pointed down to the line, "Nor do we confine ourselves to the use of the aforesaid Weldon mud," there is not a word to indicate any other than the hydrate—then you say he would not go wrong?—I suppose anyone on reading this patent, and intended to work it, would glance at the provisional specification.

Mr. Aston: No, I beg your pardon; please confine yourself to the complete.

Mr. Justice Kekewich: I do not know whether anybody would glance at the provisional specification, but you are not to.

Mr. Aston: I want you to be good enough to answer the question. Reading the complete specification, which the patentee, as you know as well as anybody, is bound to put in order to describe and ascertain the nature of his invention and the mode of performing it. You have told me that down to the words "nor do we confine ourselves to the use of the aforesaid Weldon mud" a man would go all right.

Mr. Justice Kekewich: But he only took you down to line 38, "as is well known."

Mr. Aston: Now assuming that the aforesaid peroxide of manganese is formed artificially in the mode similar to the production of Weldon mud in the chloride of lime manufacture, and is fully oxidised, and you were to follow out the process analogous to that, you would have hydrated peroxide in the other processes when you wanted to produce a peroxide?—Is that a question?

Yes. Assuming that you wanted to produce analogous results to those obtained by the specific directions to which I have called your attention, you would produce, would you not, a manganese combined with oxygen as a peroxide in a hydrated form?—And also combined with lime.

But the lime for this purpose would not be hurtful—lime is not hurtful in the Weldon mud?—It certainly would not be hurtful.

Then you can say, "Yes, it would not be hurtful. Therefore, if you use manganese combined with oxygen in the form of peroxide in a manner analogous to the directions given by the patentee you would get a hydrated peroxide?—No; you would get a compound of a hydrated peroxide.

A compound?—Manganite of calcium.

Being a lime which is innocuous. Now, supposing you read this in the spirit of how to do it instead of how not to do it, and by accident you get an anhydrous peroxide result, and you found that its action as regards the removal of iron from the sulphate of alumina solution became—assuming you are correct—less effective the less hydrated it was—assuming that, should not you as a chemist know that it was a backwardation process to use the produced peroxide in a less hydrated condition?—If experiment showed me that the less hydrated substance was less effective, naturally I should endeavour to use the more hydrated substance.

You treated the natural peroxide—the ore?—Yes.

Is not it a fact that if you follow the directions given in the specification where they are specifically introduced, you would in the first instance dissolve the natural ore with hydrochloric acid, say. Get a chloride of manganese and set free the chloride and form water, take the chloride of manganese and add lime and produce in that way a lower oxide of manganese, a protoxide, would not you then add excess of lime to that, blow currents of air through it and convert it into a hydrated peroxide combined with lime?—That is such a long question it is difficult to answer it.

I know, but have I not given you the process of treating?—You have given me a process which would work.

And have I not given you the common process. Kindly attend to my question. I ask you was not my long question substantially the common process of taking a peroxide ore and obtaining from it protoxide of manganese in the form in which it exists in the Weldon mud?—Yes, you give a very fairly accurate description of the Weldon process.

And in that you began with the peroxide of manganese ore?—Certainly.

There is no direction here in this specification to take a peroxide of manganese ore as peroxide of manganese ore, and to pound it and use it as a peroxide of manganese ore?—There is no specific direction to do so, but equally there is no direction not to do so.

I ask you whether there is a direction. You have a perfect right to put upon me that there is no direction, and I am not surprised that you have done so. But I ask you whether following that course of procedure laid down in the specification or an analogous course of procedure you would not dissolve the peroxide?—Yes, but my difficulty in reply is that the patentee after describing a method of working has said that he does not confine himself to that, and he has not said what other method he does confine himself to?—So the inference is that it leaves everything.

That will be for my Lord?—You asked me what I understood.

Following the specific directions here——— ?—As I understand them.

Following the specific directions here, should not you, as a chemist, begin with dissolving your peroxide?—Following the directions down to line 37.

Yes?—The reason why I do not say down to line 41 is that I have no experience of the method of purifying alum here as compared with sulphate of alumina.

Going down there, would you know how to begin by dissolving your peroxide if you had nothing else before you?—If I wished to prepare the artificial product I should begin by dissolving the natural peroxide.

Then, if the patentee had not gone on to say that peroxides in other forms may be used. We will suppose that he does say so—you read that he does?—By implication.

Supposing that he had not gone on to say peroxides in other forms may be used. The specification so far is good? By "good" you mean from a chemical point of view, of course.

Yes?—Yes, I think it would be good up to that point.

Now assume that every one of your experiments would to a certain extent operate in a sulphate of alumina solution to remove a certain portion of the iron therein, would that be an incorrect assumption?—With one exception I got more or less iron removed in other experiments.

Now we will go to that exception. Kindly repeat to me very carefully the one experiment in which you say you absolutely failed to remove any iron at all?—I prepared a specimen of perfectly pure peroxide of manganese by dissolving pure nitrate of manganese in nitric acid. This specimen was prepared for the purpose of some particular researches that I had in hand, and I bestowed unusual care on it to get it pure.

Never mind what your object was?—It was not made in connection with this case. I had a specimen which was prepared a few years ago for another purpose, over which unusual care had been taken to get it in a state of purity. That specimen was ground to a very fine white powder. I speak of the specimen of peroxide of manganese prepared from the nitrate.

By Gorgeu's method?—Yes, it was the original experiment for the purpose of verifying Gorgeu's statements. This specimen of peroxide prepared from the nitrate was ground to an extremely fine powder, and was then shaken up with the sulphate of alumina solution. The liquid was filtered, and the amount of iron that was present in the filtered liquid was determined and compared with the amount of iron that was present before the treatment, and the two were found identical.

In that case what proportions did you use?—The proportions specified in the patent.

The 6 per cent.?—Yes, the 6 per cent.

How long did you keep them together?—In the case of the inoperative experiment?

Yes?—I think two hours with agitation at intervals. In other experiments I used a shorter period, and I have carried out experiments where they remained in contact for twenty-four hours, but in that particular one I think it was two hours.

And is it not known that when you want a chemical reaction to take place, you may apply in some cases increased time, in others increased temperature, in others increased proportions, and that all these are variations commonly known to chemists?—Yes, certainly.

All three?—Yes.

Sulphuric acid sometimes will not answer, unless you heat it?—For what purpose?

For the purpose of causing it to react—never mind for what purpose?—Yes.

Sometimes it will not answer unless you increase the dose?—Yes.

And sometimes it will not answer unless you give it a longer time to act?—No doubt.

You have answered me that before. Now in this case was there anything to prevent you trying the Gorgeu process for six hours instead of two?—No, the only thing is that the patent specified one to two hours, that is the only reason.

You wanted to try exactly the proportions named, and the time named, in order to ascertain whether it would not answer, is that not so?—In order to ascertain whether or not it would answer.

At all events, I will ask you this. Do not you know that if you had that same experiment with increased portions you would have got a better result?—I have no doubt that in my own mind that it would have been so, but I cannot say that I know it.

Then I will put this to you. Is it not a fact that with every one of the forms of manganese that you have tried you might, if you liked, following the known operations of chemistry, known to you in the year 1882, have got the result of removing some portion of the iron?—I am not quite certain in the case you are referring to, because, supposing I had required to use 1,000 parts of the material, I should have got so stiff a mass by mixing with the sulphate of alumina solution that I could not have have filtered it.

I did not ask for 1,000 parts?—If I find 6 parts produced absolutely no result, I have nothing to guide me as to whether six or 600 would have to be used to produce the result.

Do you ordinarily, in your experiments, go from six to 1,000?—Not necessarily.

Mr. Justice Kekewick: Dr. Wright has stated that, if he is told that six will not do, he is not told that anything will do.

Mr. Aston: I am sure you will deal fairly with me?—I will try.

You knew perfectly well, did not you, when you tried the experiment with the Gorgeu process, that the oxide was not in so favourable a condition of being operated upon as it was when you used the Weldon mud?—As regards fineness of powder?

I did not say as regards its physical condition. You knew that it was not in so favourable a condition for operating upon the iron and removing it as if it had been treated in the way the patentee directs—dissolved and formed into Weldon mud?—I do no quite grasp what you mean by "so favourable a condition."

It would not act upon the iron and remove such a large proportion of it?—I knew that as a fact when I tried it.

And you knew that it would not act like that *a priori*. Did you know at the time you made that experiment that the hydrated form was one that was adapted for the purposes of the patent?—The first experiment that I tried——

Answer the question please; do not you know?—No; I do not.

You had not read this when you tried the experiment?—The first experiment that I tried on the subject was made before this patent was published, therefore I certainly had not read it.

You made the experiment in order to ascertain whether this specification was right. Did not you then know perfectly well that the proportion which he used, with the ingredients, which answered best were 6 per cent.?—Yes; but I did not know it from the specification. I may say that my first knowledge of this matter arose from the fact that I was consulted, and made an affidavit in connection with the opposition to Kynaston's patent. In connection with that I made experiments some three or four or five years ago.

You know that Kynaston proposed to use Weldon mud?—Certainly.

And having that knowledge, did you not know that the Weldon mud was a very—I will say a very efficacious form, or efficient form—or what shall I call it chemically?—I knew it on his statement, of course, before I tried the experiments.

Then knowing that, and seeing here in this specification that 6 per cent. was recommended where this efficient hydrated form was used, did not you think that you might in fairness have gone on after trying the 6 per cent. with trying a gradually increased quantity and gradually increasing the quantity—do not you think that would have been fair?—If my object had been to develop the process where the variety of manganese was used, I should have done so.

And you would have done so if you had wanted to support this specification, would not you?—I do not think I should, because I do not think an experiment which goes outside the specification could support it.

The experiment, if you will forgive me, which you did does go outside the specification, because he tells you that he does not confine himself to the proportions, and you did confine yourself to the proportions?—In that one particular case, but I think I have mentioned that in other experiments other proportions were used.

But that was the only case which was absolutely a failure. Is it not true that you in your book———?—May I ask if you are referring to one of my published papers when you say my book?

Is not this your article in the *Journal of the Chemical Society*: "Notes on manganese dioxide, by Dr. Alder Wright"?—Yes.

Do you not speak there only of manganese dioxide, meaning thereby peroxide of manganese as we have called it in these proceedings?—Yes; the words occur frequently enough.

Manganese dioxide and peroxide of manganese mean the same thing, do they not?—Yes.

Do not you constantly in your paper speak of the dioxide of manganese when you mean the hydrated form?—Frequently, for the very simple reason that the word occurs on every tenth line. It is a somewhat long paper, and it would have added two or three pages if I had not used the elliptical expression.

Is not peroxide of manganese as you have used it here in your popular paper understood to mean hydrated peroxide?—No doubt from that context.

At pages 33, 35, 36 and 40 and the heading?—Yes.

You know "manganese dioxide precipitated by bromides in the presence of potassium," and so on. Does not that mean hydrated?—Certainly. There are analysis given two or three lines later on which state what it is.

And there are several other instances?—Yes, all through.

I put it to you whether it is not here that in every case you formed your anhydrous peroxide of manganese—or in nearly every case you in the first place formed the hydrated peroxide of manganese, and then reduced it to the form of anhydrous?—On the contrary, I do not think I got the anhydrous substance in a state of purity in any one instance from a hydrated body.

Did you in any one instance get the anhydrous form absolutely pure that you are certain of?—The purest specimen that I had.

Answer my question. I ask you if you will pledge your reputation as a chemist, and say, "I am sure that that was absolutely anhydrous, because every particle of $H_2O$ was driven off?—The purest specimen that I had would still have two-tenths or three-tenths of water on heating to a red heat. I cannot answer the question otherwise than that.

In the majority of cases, or in many of the cases, did not you go through the state of hydrated peroxide before you obtained what you were aiming at, anhydrous peroxide?—No.

Not in any of them?—No; the substance———

I will take your answer. If you say "No" I will pass on?—I wish to say that the substances that are examined in the anhydrous state are prepared by a different process.

And a long and difficult process in order to ensure that you should get the anhydrous result?—On the contrary, a much more simple process.

Much more simple than the hydrated?—Yes, it was simply heating the nitrate to a specified temperature.

But assuming that you did not want to apply heat; there are plenty of ways of getting the hydrated without applying heat?—The hydrated, but not the anhydrous.

I know, but in some cases you are obliged to take extreme measures in order to secure the anhydrous form, are you not?—I did not succeed in getting the pure anhydrous form out of any hydrated without either leaving a considerable amount in or else driving off a considerable amount of oxygen.

You have heard of the name of Roscoe?—Yes, I have.

And you know the book of elementary chemistry with the very well-known spectra in front?—Yes, I know the book very well.

It is called Sir Henry Roscoe's Lessons in Elementary Chemistry. At page 196 I read as follows: "Manganese dioxide $Mn O_2$ is the common black ore of manganese, and is termed pyrolusite by mineralogists; it can be artificially formed by adding a solution of bleaching powder to a manganese salt." You do not dissent from that?—In the strict sense of the term $Mn O_2$ is not formed in that way.

Then Sir Henry Roscoe is wrong?—If you are going to take the words as they grammatically stand the statement is not absolutely correct.

Now, is your statement absolutely correct when you speak of your dioxide when you mean hydrated?—No.

"This substance yields one-third of its oxygen when heated to redness forming the red oxide $3 Mn O_2 = Mn_3 O_4 + O_2$, and gives up half its oxygen when heated with sulphuric acid. It is largely used for the manufacture of chlorine, and precipitated as a black hydrated powder by adding an alkaline hypochlorite to a manganous salt." That was very well known?—Certainly.

You know Dr. Lunge's book, do you not?—He has written several.

I will tell you the exact title, "A Theoretical and Practical Treatise on the Manufacture of Sulphuric Acid and Alkali in the Collateral Branches," by George Lunge?—Yes, I have read the book.

And know it well. He is an authority?—Yes.

Now, hear what he says about the Weldon process, at page 197: "Weldon's process is founded on the fact that freshly precipitated manganese hydro-oxide, suspended in a solution of calcium chloride, is, in the presence of an excess of lime, easily converted into peroxide by a current of air forced through the liquid." That is a correct description, is it not?—You see he begins by stating that you have manganous hydro-oxide, which means a hydro-oxide to begin with. The presumption is that he ends with a hydro-oxide.

The presumption is, certainly, but when he describes it he speaks to chemists. This is a practical handbook, is it not?—Yes.

In that he tells you, peroxide, but he meant hydrated peroxide, did he not?—Certainly.

And everybody would have understood that?—That hydrated peroxide was meant in that case?—Yes.

Yes?—Certainly.

And that would be the meaning put in the forefront. Anybody who tried to make out that Dr. Lunge there meant anhydrous would be stretching a point?—It would be an absurdity to say that you could get an anhydrous body by adding in a hydrated element.

And is not that what Mr. Spence tells you in his specification?—I fail to see exactly the analogy.

Mr. Spence tells you what Dr. Lunge does—to make Weldon mud—and tells you how to get a peroxide. And it would be absurd to say that Dr. Lunge meant anhydrous. Then, by analogy, would you not say, in the first instance, that Spence's meant you to get the hydrated, and use the hydrated?—Certainly, in that part of the specification up to line 41.

I suppose, if you were minded so to do, you could make a hydrated oxide by the deoxidisation of the manganites, could not you?—Not in the pure state, by simple dehydration.

You could get it so as to make it suitable for removing iron from sulphate of alumina?—Yes, but that is because you would also remove some oxygen, and get some lower oxides as well.

If you left them in the state of lower oxides, they would go to solution, would not they?—Partly; at any rate, some would.

Therefore, although you might find them efficient for the purpose of removing iron, you might do mischief if they went into solution?—Unless one took the trouble to remove them afterwards. For certain purposes they might easily be as prejudicial as the iron.

Then is it not true that you must either remove these lower oxides after they have gone in solution, or you must prevent them going into solution by having complete oxidation. Is not that true?—You must prevent them going into solution.

Yes, by having complete oxidation, and having them in the form of peroxide?—It is not indispensable, because you can remove them after they have gone into solution. But assume there were no means of removing them subsequently, and that they were prejudicial, you would of course have to take means to prevent them going into solution.

And would not converting a completely oxidised lower oxide or protoxide into a peroxide answer the purpose—No. If you were to take protoxide and completely convert it into peroxide, which I have done, you would get a product which is practically inoperative.

But is not that what has been done in the Weldon mud? No. You start with a hydrated peroxide.

I quite agree, but do not you there convert the lower oxide—the protoxide—into a peroxide?—In one sense you do, without doubt.

Now, I put this to you. Reading the spirit of this specification—knowing what the specification begins with, and knowing the object, do you not think that a person would go out of his way in order to use the anhydrous form when the hydrated form was ready to hand?—It would depend which of the two was most easy to get in the first instance. A man who has Weldon mud on his premises would very likely use it, but a man who did not happen to have Weldon mud handy would probably buy the native ore as being the most convenient thing to use.

Supposing he bought the native ore, would he not treat it with hydrochloric acid and convert it into Weldon mud by reading this specification?—Yes, that is if he confined himself down to line 41.

RE-EXAMINED BY MR. LAWSON.

That little book of Sir Henry Roscoe's which my friend Mr. Aston put to you is not the only book on the subject which Sir Henry Roscoe has written, is it?—There are very many text books.

This one is a very elementary book, is it not?—Yes, intended for elementary students.

What I have in my hand is a larger book—a treatise on chemistry by Professor Roscoe?—I know the book.

In that book he states in full what he has abridged in the smaller edition.

Mr. Justice Kekewich: If you wish to ask Dr. Wright whether he agrees or disagrees with any passage, by all means ask him, but I protest against these books being put in.

Mr. Lawson: I understood my friend to say that Professor Roscoe has used the peroxide in a particular sense.

Mr. Justice Kekewich: Mr. Aston used the book I think properly. He read the passage, and asked him whether he thought that was right.

Mr. Lawson: Then I will read the passage.

Mr. Justice Kekewich: That is what you are entitled to do.

Mr. Lawson: "Pure manganese dioxide is obtained artificially by a moderate ignition of the nitrate."

Mr. Aston: That is exactly what I read.

Mr. Lawson: Does not that show——

Mr. Aston: What does it show?—That Professor Roscoe makes a distinction between the hydrated oxide and the anhydrous one, and that he does not use the term anhydrous, but uses the term hydrated.

Mr. Lawson: In your own paper to which my friend Mr. Aston referred, in the very first five lines you refer to a former paper, in which it was shown that pure hydrated manganese dioxide is not produced by two of the processes usually described as giving rise to the substance, viz., acting on potassium permanganate nitric acid, and treatment of manganese chloride with sodium hypobromite; the result contained considerably less 'available oxygen' than corresponds with the formula $Mn O_2$." You use that expression? Yes.

What did you intend to refer to by that?—The substance $Mn O_2 H_2 O$ containing water and manganese dioxide in the proper chemical proportions.

Later on you describe certain analyses, all of which contain water apparently. What does that show?—That I was dealing with hydrated substances containing various amounts of water in hydration.

Mr. Aston asked you some questions about Spence's specification. Directions to fully oxidise by modes well known. Do all these modes produce hydrated forms?—Oxidising Weldon mud.

Oxidising Weldon mud?—All but one, and that would be the action of nitric acid and considerable heat.

Would that produce hydrated?—If the heating was the proper temperature it would produce anhydrous.

So that if you use one of the methods which is well known you might get a product that would not act?—Quite so.

Mr. Aston: Would you tell me the date of the edition of Roscoe which you read?

Mr. Lawson: 1884.

Mr. Aston: That is after the date of the specification.

Mr. Lawson: My friend, Mr. Aston, asked you about the words, "combined with manganese peroxide." Taking those words alone, do you consider that as a description in which Weldon mud is included?—Taking those words alone, certainly not.

EXAMINED BY MR. JUSTICE KEKEWICH.

Will you turn to the end of Spence's specification—the very last line at the bottom of page 2? You see what he claims—"the use of manganese combined with oxygen as peroxide." I do not want you to read any further, but tell me what you understand by what is there described in these words, "manganese combined with oxygen as peroxide." Can you give it me in any one expression?—I think those words can only mean one thing, and that is the substance which was substantially $Mn O_2$.

Is that hydrated or anhydrous?—Anhydrous. He is speaking of combined with oxygen, not combined with anything else.

For this purpose we will read that as being $Mn O_2$. Now, "whether produced from lower oxides by oxidisation"—can you produce $Mn O_2$ from lower oxides by oxidisation?—Yes, easily.

"Or from manganic acid?"—Manganic acid does not exist in the strict sense of the term. It has not been produced.

"Or permanganic acid?"—That might be done.

"Or with their salts?"—Both of them easily, in the hydrated form.

Could you produce a hydrated form from the lower oxides by oxidisation?—Yes, easily.

You could produce either one or the other?—Quite so.

And would you say the same as regards the others?—Yes.

The latter part of the sentence refers both to the hydrated and the anhydrous form?—It could refer to both.

The first part refers, you say, to the anhydrous form?—I think to a chemist it legitimately implies that.

Necessarily?—I think so, to "peroxide." It certainly means that, I think.

If an intelligent chemist—I do not mean Dr. Wright—sat down to try and to produce this thing, could he misunderstand that so far as to take a hydrated form. You say it is anhydrous—you say it is necessarily anhydrous or implies so to you?—I think the intelligent workman would be rather at a loss to know whether he was to go by the specification up to line 41 or by the claim.

I want to put this to you. You call an intelligent workman. I tell him, "I want for the purpose of some experiments what is described here in this last line, 'manganic acid combined with oxygen as peroxide,'" would he necessarily bring you the anhydrous form?—I think he would.

Necessarily?—If he read that without the other part.

He would not by any excusable blunder you think produce the hydrated form?—I do not think he would.

I only want your opinion.

Mr. Lawson: My Lord, I have read a note from the other side, and I understand that the London and North-Western Railway Company say that the search for delivery orders will be very heavy, and they ask whether through charges will be paid. I understood they were going to give us some information in the early part of the day. I do not know whether we ought to ask your Lordship for a subpœna.

Mr. Aston: It is in these words—it is headed, "London and North-Western Railway. District Goods Manager's Office, Manchester," and it is addressed to "E. Robinson Walker, Esq., legal clerk," and so forth, in London—"Dear Sir,—In reply to yours of the 9th, I presume you refer to the traffic forwarded by the goods train from Widnes and other places. If so, at this late date, I question whether we are in a position to give the information asked for, but, if we can, it will be a work of considerable labour, and I shall be glad to know whether you are prepared to pay the cost.—Yours respectfully." Shall I hand your Lordship up a copy of the letter which was sent?

Mr. Lawson: It is suggested to me that these parcels go by passenger train.

Mr. Justice Kekewich: That was suggested on Friday. I read this out at the time—"London and North-Western Railway Company—Passengers Station."

Mr. Aston: Shall I read the letter we sent to the London and North-Western Railway?

Mr. Justice Kekewich: I will look at it. [*The letter was handed to his Lordship.*]

Mr. Aston: Your Lordship will also find we have also said "parcels."

Mr. Justice Kekewich: I see that though that is so, it is addressed to the Goods Department. That may be right; I do not know, but it is "parcels" in the body of the letter. It is addressed to the L. & N. W. Ry. Co., Goods Department. Therefore, your answer comes back from the District Goods Manchester Office. I am not familiar with Manchester, but unless I am very much mistaken the Goods Department and the Passenger Department are entirely severed—physical and otherwise. You had better send a copy of that without the pencil notes at the bottom. I think it is desirable if we possibly can to clear up this matter.

Mr. Aston: I must have back the original, please. If Mr. Walker will be good enough to have a *facsimile* copy made of the document without the pencil note which was added, and have it sent to them, then if they cannot give us the detailed information, they would be able to tell us whether there were other parcels, and whether it came from Widnes.

Mr. Lawson: I think the cost of this matter ought to be costs in the action.

Mr. Justice Kekewich: Yes; I think they ought to be, Mr. Aston. It is suggested that any costs incurred in communication with the Railway Company must be costs in the action. I think that ought to be so.

Mr. Aston: Yes, my Lord.

Mr. Aston: My Lord, before I call Professor Dewar there are two questions which I intended to put to Dr. Wright yesterday, but which, in the hurry of his cross-examination, and I, not having had a full opportunity of considering his evidence, omitted to put. Besides, I had not the document upon which I wish to ask him the question.

Mr. Justice Kekewich: We will not consider the reasons, Mr. Aston. If you want to ask Dr. Wright a few more questions, and he is here, you may ask him.

Mr. Aston: I am obliged to your Lordship.
Dr. C. R. A. Wright, recalled.

FURTHER CROSS-EXAMINED BY MR. ASTON.

You said yesterday that the forms of peroxide that were anhydrous would not answer the purpose, and that the forms of peroxide that were hydrated would answer the purpose of the patentees, Messrs. Spence? — Speaking generally that was so.

You gave evidence in a case that has been reported, and of which I have handed up a report to my Lord, the well-known *Badische* case?—I remember it.

Will you be good enough to look at the document which I handed up yesterday. It is the specification of Johnson in the *Badische* case. You know that document?—I have seen other copies of it.

And you have a fairly good recollection of the subject matter. If not just cast your eye over the claim.

Mr Moulton: This is very far afield, is it not?

Mr. Aston: Wait till the question is put before you object.

Mr. Justice Kekewich: The witness had better not answer the question until we see what it is.

Mr. Aston: This claim is for the production of the sulpho-acids of oxyazo-naphthaline by following certain directions? That is one of the claims.

You gave evidence on that occasion that some directions contained in the specification failed in producing results?—I did.

And the evidence you gave on that occasion you believed to be true?—I am quite sure of it.

Are you still sure of it now?—I am.

That some of the materials directed to be used would not answer the purpose?—On a commercial scale it would be utterly impracticable. I was of that opinion then, and I am of that opinion still.

And it was on that ground that you gave your evidence on that occasion, contrary to the validity of the patent?—Yes; on that particular point.

In your affidavit in this case, paragraph 2, you say, I am of opinion that peroxide of manganese pure and simple is not capable of being effectually employed for the purification of sulphate of alumina, whereas Weldon mud is capable of being so employed. Are you of that opinion still?—Quite of that opinion. The peroxide by itself, pure and simple, cannot be used effectually, but Weldon mud can.

Mr. Justice Kekewich: That does not seem to me to add to the stock of information we had before.

Mr. Moulton: Your Lordship quite understands that I object to those first questions as being outside the limits of evidence in this case. They may come in, but I do not see how.

Mr. Justice Kekewich: You ask a scientific witness whether, on the further consideration which he may be supposed to have given to this or other cases, he still remains of the same opinion which he has before expressed.

Mr. Aston: That is so.

Mr. Justice Kekewich: That is not an improper question; whether it is a useful one may be another matter.

*(To be continued.)*

## MODERN BLASTING AGENTS.

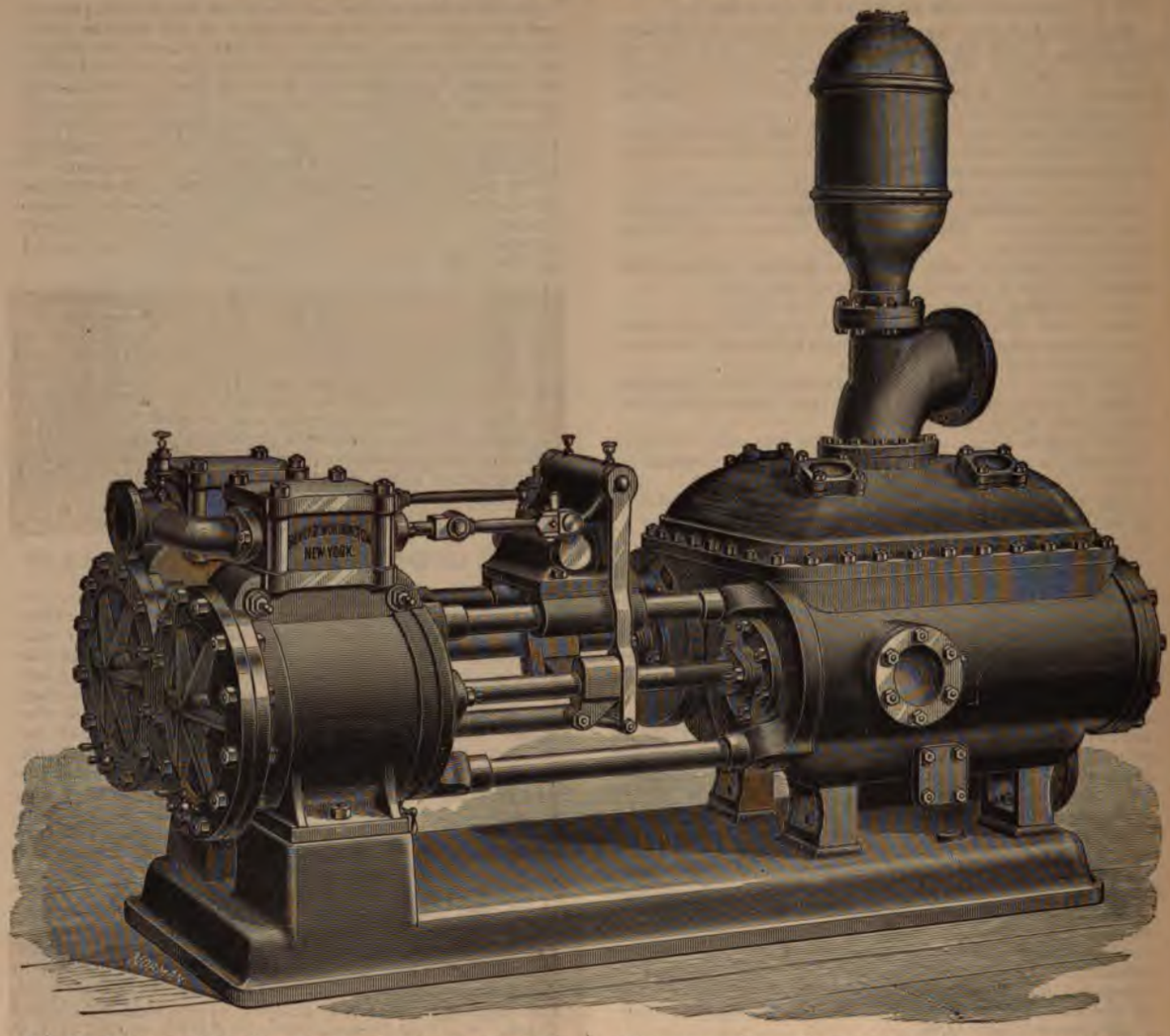
MR. F. J. SHAND, assistant manager of Nobel's Explosives Company Limited, Glasgow, delivered a public lecture recently under the auspices of the Edinburgh Association of Science and Arts, in the Society's Hall in George Street. Mr. John Melrose presided over a fair audience. Taking for his subject, "Modern Blasting Agents," he said there were at present over fifty explosive mixtures in use, but he proposed to confine himself to those substances most employed for blasting purposes. Endless varieties of explosive mixtures could be produced, and hence the exaggerated newspaper paragraphs which often appeared in regard to new explosives. He proceeded to discuss the requirements for a good blasting agent, and gave a list of the comparative powers of the usual blasting substances, which showed that blasting gelatine exerted most force. The power depended on the quantity of the gases generated and the rapidity with which they were produced. He spoke of the various purposes to which the chief blasting agents were applied, and showed the suitability of blasting powder for quarrying, as it was comparatively slow in exploding, and broke up the rock without shattering it to fragments. Though it had many defects no substitute for it had been produced where a mild agent was wanted. Mr. Nobel's work in producing nitro-glycerine and dynamite was described, and the lecturer next spoke of the mode of the manufacture of dynamite and of blasting gelatine at Ardeer, in Ayrshire. The manufacture of gelatine was dangerous, but once made it was the safest of explosives. Dynamite was most suitable for blasting hard rock, and as it gave off very little fumes it was a valuable agent for blasting in mines. It was not liable to spontaneous explosion, and temporary contact with water did not spoil it. He narrated experiments which had been made showing the great safety there was in handling dynamite, and showed that nitro-glycerine compounds were regularly carried over great distances and in hot climates. He pointed out that all these compounds could only be exploded by detonation, and not at all by mere ignition. Blasting gelatine was 50 per cent. stronger than dynamite, and five times stronger than blasting powder. It was the strongest and best of explosives. It was not affected by submersion in water for any length of time. Owing to its cost it had been superseded for mining purposes by gelatine-dynamite, which, while cheaper, had all the good qualities of blasting gelatine, except that it was not so powerful. He next showed that for such work as tunnel-boring through hard rock economy was secured by using the stronger explosive agencies in preference to blasting powder. The lecturer proceeded to describe the water cartridge now in use in coal mines, which gives off no flame when exploded, and thus obviates gas explosions in fiery mines.

## THE ONWARD MARCH OF THE GERMAN CLERK.

"THERE will very soon be no more English Merchants, because your young men will not learn the new conditions of trade. In every office there must be clerks who can write and speak foreign languages. Your young men will not learn them, and your schools cannot teach them. Then we come over—we who have learned them. For my part, I can write and read English, Swedish, Danish, French, Spanish, Italian, Dutch, and German. Do you think we shall be content to stay here as clerks? No—no. Do you think that I have come here to sit down with £40 a year? We are cheap, we German clerks. You say so. Mein Gott! you will find us dear. We are learning your trade; we find out all your customers and your correspondents; we learn your profits, and we undersell you. We do not go away; we remain. And presently, instead of an English house there is a German house in its place, because your young men are so stupid that they will not learn. I study English commerce; I study how it began, and why it is now coming to an end. The English clerk will not learn anything, and expects to be paid like an Amstrichter at least. In Deutschland we learn, and we are poor at first. Jawohl! we are poor, but we can wait. It is your high salaries in your army, in your navy, in your Church, in your trade, in your Administration, which ruins Great Britain. Everywhere the German merchant drives out the Englishman and the American: your commerce goes out of your hands: for the moment only it remains in London, thanks to the Germans and the Jews. When we have taken Antwerp it will all go there—all. And where will be your London then? All—all shall be Deutsch. . . ." Then he fell into a philosophical vein. "Let us look around. Already France decays—for want of men. England has begun to decay, for there will soon be no more bauer, no villagers, for soldiers and to make strong and pure the bad blood of the towns. Deutschland alone will spread until it has swallowed Holland, Belgium, Scandinavia, and India and the English colonies, and has controlled America. There will be only three nations left in the world—Deutschland, Russia, and China. Will there be one grand world kingdom, with Berlin for its centre? Always we see, in history, commerce which passes from hand to hand: everywhere one people which decays and one people which advances. It is curious; it is wonderful."—*"Katherine Regina," by Walter Besant.*

PROGRESSION.—Mr. Joseph John Candlish, of the firm of Robert Candlish and Co., glass bottle manufacturers, Seaham Harbour Bottle Works, Sunderland, having inspected Ashley's patent machine for the manufacture of glass bottles in operation, has joined the board of the European and American Bottle Company Limited.

# THE WORTHINGTON PUMPING ENGINE.



IN the leading article of our last week's issue we called attention to the probability of a short supply of water during the coming spring and summer, and endeavoured to point out the inconveniences which would result to many manufacturers if this fear should turn out to be well-founded. Bleachers, dyers, and calico printers require a very large supply of water, and the same may be said of all those engaged in the paper making industry. Water required for industrial purposes need not be subjected to that rigid scrutiny of analysis to which potable waters are generally put, and if it is fairly free from suspended matters and iron compounds it is usually considered quite good enough for most purposes of trade, and therefore as most works are situated in localities where well-water is obtainable, it is only a question of putting down suitable pumping machinery in order to procure a good supply of water, not costing more than it could be purchased at from local authorities, and in many cases a great deal less.

The neighbourhood of Manchester is well suited for a trial of individual pumping for trade purposes. There are but few of our readers who will have forgotten the large quantity of water which was struck at Gravel Lane, near to Flat-iron market, during the construction of the Salford intercepting sewer some years ago, and the immense amount of pumping necessary for nearly a year to enable the construction to proceed, so that we feel assured good water may in nearly every instance be obtained by sinking for it, in quantities sufficient to repay the outlay. Of course to do the thing thoroughly and well it will be necessary to settle upon the best system of pumping engine, and the one we are about to describe may possibly have attracted many of our reader's attention at the Manchester Royal Jubilee Exhibition. We allude to the Worthington Pumping Engine, which is at the present time supplying from 40 to 50 per cent. of the whole domestic water supply of the United States, and is the only pump that has been successfully applied to the transportation of petroleum through the oil-pipes lines there. Our readers will also remember that the contract for pumps, for the water supply in connection with the Suakim-Berber railway scheme, was given by our Government to the Worthington Company in competition with all British and other makers.

It is not our desire to in any way deprecate the employment of our British manufactures, or to unduly elevate the productions of aliens, but facts are stubborn things; and when the best machinery is being sought after, the item of nationality should be left out of sight altogether. In fact, we hope the time is not far distant when every nation will possess a majority of sound-thinking men of sense, who will rule and will appreciate the fact that national feuds are caused by the machinations of ambitious diplomatists, or the greed of already over-rich speculators, and that the human race is one family and may some day live and trade together in peace and goodwill.

But to return to our subject. The Worthington Pumping Engine is so constructed as to give a continuous and uniform supply of water or other fluid: there are no dead points at any part of the stroke, the valve motion being perfectly positive, so that the pump starts off at any part of the stroke.

minimum. All the parts are exceedingly simple, and are not liable to get out of repair, so that anyone who has ever seen a steam engine is perfectly able to take charge of and manage this pump. It is adapted for all purposes, and the valves are made in either gun-metal, rubber, or composition, to suit the requirements of special trades. As a part of a chemical plant, this pump would be very valuable where large quantities of fluid have to be moved to a higher level, and being self-contained, compact, and requiring but light foundations and little attention, are sufficient good points to recommend it.

As may be supposed, there are many patterns of this pump in use, from the "Low Service" pump, specially used where the liquid is to be only raised a few feet—such as filling oil tanks or water reservoirs at railway stations, or emptying water ballast from vessels—to the splendid Compound Condensing Pressure Engines built for the National Transit Company's oil-pipe lines. As an example of this latter kind of pumping engine, we may mention the pattern having a pair of high-pressure cylinders, 41 inches in diameter, the low-pressure cylinders being 82 inches in diameter, driving a 12 inch plunger through 36 inch stroke, and delivering one million gallons of oil per day against a pressure of 1,500lb. per square inch.

These types may be taken as the extremes; neither of them will perhaps be required by any of our readers, and therefore we will illustrate the ordinary form designed for all purposes where the water pressure does not exceed 130lb., which is equal to a head of 300 ft.

The illustration represents the regular pattern pump, having steam cylinders 20 inches in diameter and a stroke of 15 inches, the diameter of the water plungers being 12 inches, it is known in the telegraphic code by the word "Victor." It may be run at any speed, varying from 50 to 90 strokes per minute, and at these rates of travel will deliver from 36,000 gallons per hour at the lower speed, to 66,000 at the higher, or a maximum daily delivery of over a million and one third gallons. When we come to consider the price of these pumping engines, we shall see they are most favourable with regard to the work done. A pump to supply three millions of gallons per day costs £420, while one to supply a million gallons per twenty-four hours costs but £180. The peculiarity of this pumping engine is that it allows the piston to attain a high rate of speed without noise or hurtful concussion. Most single cylinder pumps work under very different conditions to the Worthington double plunger system, and instead of any violent concussion of the valves at a high rate of speed, the piston quietly cushions itself upon steam at the end of the stroke, pauses for an instant until the water valves have seated themselves, and then starts on the return stroke gradually as its steam valve is opened by the motion of the opposite piston. The oil-pipe lines companies have found the concussive action of ordinary single cylinder pumps very destructive to their pipes and fittings, causing constant leakage, and this no doubt is the case in many other industries working pumps under high-pressures.

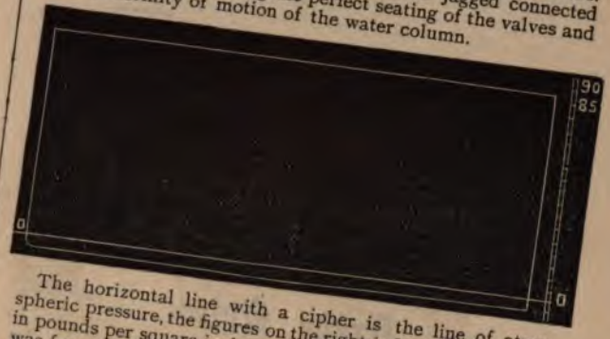
Bleachworks use large quantities of spring water; we know of one typical case where two large pumping engines are used in the neighbourhood of Manchester, and may serve to illustrate what are the general requirements. In this instance the main goyt bringing water from the river Irwell into the works was used partly for rough purposes in the croft, and partly to turn a waterwheel of considerable size. The "clough" was only up during eleven hours of the day, and in that period no less than three and a half million gallons entered the works. The two pumps between them raised six hundred and forty thousand gallons per working day of thirteen and a half hours, from a well, and this water was used for all the finer purposes of bleaching. The analyses of these two waters may be interesting:—

| | GRAINS PER GALLON. | | |
|---|---|---|---|
| | River Irwell. | | Well Water. |
| Hardness by Clark's test ..... | 12·80 | ... | 13·20 |
| Chlorine..... | 1·93 | ... | 1·42 |
| Total solid residue ..... | 28·20 | ... | 22·31 |
| Suspended matters ..... | 4·89 | ... | nil. |
| Iron calculated as peroxide ..... | 0·32 | ... | 0·06 |
| Ammonia ..... | 0·12 | ... | 0·001 |
| Albumenoid ammonia..... | 0·02 | ... | 0·001 |
| Nitrogen as nitrates, etc. ..... | 0·37 | ... | 0·268 |

The well water was considered of excellent quality, and though nearly double this quantity could be pumped by a Worthington engine costing but £180, the pumps actually used cost nearly three times that sum, and occupied much more space besides.

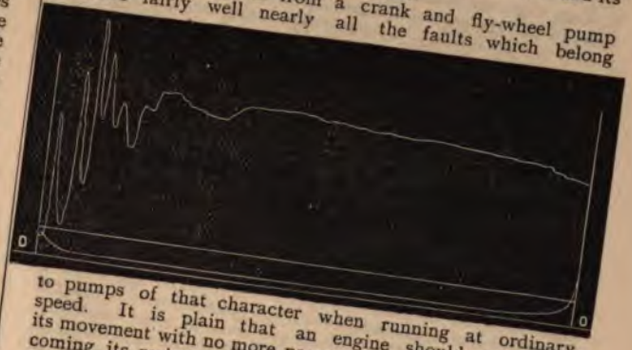
We have already described the action of the steam pistons, and shown how they blend the work of one into the other, so as to alternately take up the load, whereby the pumps, under heavy or light pressure, work without jar or noise. An indicator diagram taken from the pump while working shows this result most strikingly. It is not often that diagrams are taken from pump cylinders in England; we have seen but few, and it may be interesting for students in hydraulic engineering to follow up this line of research.

The following is a diagram taken from a Worthington pump delivering five million gallons per twenty-four hours. It shows no rounded corners, no wavy or jagged connected lines anywhere, proving the perfect seating of the valves and the uniformity of motion of the water column.




The horizontal line with a cipher is the line of atmospheric pressure, the figures on the right indicate the pressure in pounds per square inch; the travel of the pump plunger was from left to right. Almost instantly the pressure rises from 7½lb. below the atmospheric line to 88lb. above it, and the plunger continues to move against this pressure until it arrives at the termination of its stroke at the upper left hand corner of the diagram. Now it starts on its return stroke, thereby placing the indicator in communication with the supply. As this can only reach the pump chamber by exhaustion the pressure immediately drops to its minimum of 7½lb. below the atmospheric line. The quickness with which these changes are made may be seen by the sharp corners and rectangular shape of the diagram described by the pencil, and the uniformity of pressure throughout the stroke is shown by the steadiness of the top line and its parallelism with the atmospheric line.

The next diagram from a crank and fly-wheel pump shows fairly well nearly all the faults which belong




to pumps of that character when running at ordinary speed. It is plain that an engine should commence its movement with no more power than is required for overcoming its resistance, passing through every point of its stroke with the same exhibition of force until its termination. It does not need to be said that noisy and concussive action is *never* harmless in a pumping engine; as the dripping water wears away the rock, so the hammer of a piston or the snapping of a water-valve (which to many appears insignificant) is, when repeated sixty times a minute for days or years, a sure cause of fatigue of material and ultimate breakdown. No pump can be said to be running correctly that does not when running at proper speed, furnish an indicator diagram of respectable character as to square corners and smoothness of outline.

Now, as to cost of pumping water—say per thousand gallons, to a height of 100 feet. It has been several times demonstrated that the duty of the Worthington Pumping Engine has exceeded 77 million foot pounds per cwt. of fuel consumed, which is 77,000 gallons raised one hundred feet high. This of course is only to be reached with the best and

most economical form of engine, and cannot be obtained with the regular pattern we have illustrated; still if we allow 25 per cent. for compounding and 25 per cent. for condensing, we shall not be very far wrong in saying that with this pump a million gallons of water may be raised daily with one and a half tons of coal. Reckoning, therefore, that the pump will work for three hundred days in the year, and the boiler furnace consume 450 tons of coal in that time, we are in a very good position for calculating what would be the cost of pumping per thousand gallons. It is as follows:—

| *Capital outlay*— | £ |
|---|---|
| Pump and fixing | 260 |
| Boiler and chimney | 460 |
| Outlay on well | 380 |
| | £1,100 |

| *Annual expenditure*— | £ |
|---|---|
| Depreciation on £1,100 at 10 % | 110 |
| Wages for two men | 180 |
| Fuel, 450 tons at 8s. | 180 |
| Sundries | 50 |
| | £520 |

This would produce 300 millions of gallons annually, costing therefore under one halfpenny per thousand gallons.

Surely this should be a sufficient inducement for those who are buying water to commence pumping for themselves.

# Trade Notes.

Dynamite Accident in Manchester.—At the Cinderella and General Meeting of the Chemical Club held on Friday, the 24th ult., an accident occurred during a lecture on Electricity by Mr. Williamson, of the Edison and Swan Company, which might have been attended with more serious results. Experiments were being shown with a dynamite cartridge when it exploded, and the canister in which it was contained burst, driving portions of the apparatus amongst the audience. Two gentlemen were cut about the face, while another had a piece of tin driven through his boot, imbedding it in the flesh. Dr. Carr was, however, present, and succeeded in extracting the unwelcome visitor with his penknife.

The Cost of Legislation.—Coalowners are now beginning to find the cost of the new Mines Act. They have new safety lamps in many instances to provide; ambulances and similar appliances to provide; at times explosives other than gunpowder to use; and they have additional labour to employ. It is manifest that the cost of producing the coal is increased by the new Act, but it is far too soon to estimate the extent of increase. Still, the general fact remains that the Act, like other legislation of late years, in the main increases cost of working, though against that is to be set the fact that the tendency now is to minimise the standing charges by spreading them over a larger output.

Manufactured Wine.—Since the vineyards have refused to meet the demands of the market, the manufacturers have had to go to work to make up the quantity, using 34,982,000 kilogrammes of sugar in the process. In addition, the wines manufactured in divers ways in 1887, from grape skins already pressed, amount to 2,935,733 hectolitres; while the wines made from dried raisins are given at 2,617,646 hectolitres. There are no statistics given of the blackberry juice, logwood colouring, and essential oils chemically extracted for purposes of flavouring.

Lancashire Colliers and their Wages.—The colliers of South-East Lancashire, who number nearly 100,000 men, have given notice that their present engagement will terminate at the end of February, if the masters do not abate deductions made for dirt sent up with coal.

Disappointed.—The dividend of Samuel Allsopp, Sons, and Co. Limited, which was officially announced last week, is at the rate of 6 per cent. per annum. The *Financier* observes that as much as 10 per cent. having been looked for in some quarters, a good deal of disappointment was expressed, and the price of the company's shares fell to 11¼–½. This is a reduction of 1¼ per share for the day, and is equal to about 12½ per cent. Explanations from the board are awaited by the market. The 6 per cent. preference £10 shares of this company were quoted 12⅞–13⅛, showing little variation.

The Import Duty on Spirits in Spain.—Our Madrid correspondent informs us that it has been proposed in the Spanish Cortes to apply a supplementary tax of 100f. per hectolitre on all foreign spirits imported for manufacturing purposes, and to exempt the inland distillers from taxation during ten years.

The Quality of the Leeds Water.—At the monthly meeting of the Waterworks Committee of the Leeds Corporation held last week, Ald. Woodhouse in the chair, the following analysis of the Leeds water supply by Mr. T. Fairley, was presented to the committee:—

Analysis of water from the Leeds town supply, received from Mr. T. Hewson, C.E., taken at Cliff-road, January 18th, 1888.

The sample contains in grains per gallon—

| | | | | | |
|---|---|---|---|---|---|
| Chlorides equal to common salt... | 1·64 | containing | chlorine ..... | 0·99 |
| Nitrates of calcium, etc. ..... | none. | ,, | nitric acid ... | none. |
| Calcium sulphate ..... | 3·01 | | | |
| Calcium, magnesium, salts, etc... | 1·24 | ,, | injurious metals | none. |
| Volatile and organic matter ..... | 0·75 | ,, | ammonia ... | 0·0008 |
| | | | organic ammonia ..... | 0·0050 |
| Total dissolved solids ... | 6·64 | | | |

Sediment deposited on standing.—Very minute quantity.
Colour of column two feet in depth.—Yellowish tint.
Smell when warmed to 100° Farenheit.—No smell.

| | | | |
|---|---|---|---|
| Hardness of the water in Clark's degrees ..... | total..... | 3·3 |
| ,, ,, ,, ..... | permanent ..... | 2·3 |
| ,, ,, ,, ..... | temporary..... | 1·0 |

The proportions of ammonia and organic matter are within the limits found in pure drinking waters. The analysis, microscopic examination of the sediment, and the hardness show that this is a pure soft water, well adapted for drinking and for general use.

Gross Carelessness or Spite?—A naval court of inquiry is now sitting to investigate the case of supposed malicious damage to the machinery of her Majesty's ship *Buzzard*, recently built at Chatham Dockyard. Metal turnscrews were found in the cylinder of the port engine, thus destroying part of the piston head, and eventually caused the breakdown of the machinery.

Depreciation of Property.—Witton Park, from an industrial point of view, is the conscript of Durham villages. The stoppage of Bolckow, Vaughan and Co.'s Witton Park Ironworks a few years since dealt a blow to it from which the neighbourhood has never recovered. Property has fallen to nominal values. Houses are let so low as sixpence per week. Under these circumstances there is naturally a good deal of curiosity as to auction sales. Two took place a few Mondays ago. The first was at the Durham Ox Inn, Woodside, the lot including that inn, the dwelling-house known as the Heckle Wood House, with orchard, byre, shed, etc., four adjacent cottages, and three grass fields, the latter giving a total measurement of about seven acres. There was a good attendance. Mr. G. Emmerson was auctioneer, and took occasion to say that twelve years ago that inn was worth £1,500. The property was bid to £600, and withdrawn at £750. Shortly afterwards, at the Vulcan Hotel, Witton Park, Mr. D. Armstrong, auctioneer, offered a copyhold dwelling-house and butcher's shop, and four copyhold dwelling-houses adjoining. This lot was also withdrawn at £400.

The Glasgow Exhibition.—We have now come almost within measurable distance of the opening day. There are about 1,200 Exhibitors, 1,100 from Great Britain and 100 from abroad. Of English exhibitors, 83 belong to London. In Lancashire, Manchester comes first with 32. Liverpool following with 15. Then we have Rochdale, three; St. Helens, three; Preston, two; Bolton, two; Bury, two; Stockport, two; Widnes, two; Oldham, two; and one each from Hapton, Ashton-under-Lyne, Church, Delph, Leigh, Ashton near Newton-le-Willows, and Earlstown. In Yorkshire, Sheffield heads the list with thirteen, Leeds following with ten, York with eight, Halifax with three, Elland with two, Huddersfield with two, Hull with two, Pontefract with two, and Keighley, Middlesbrough, Rotherham, Shipley, and Wakefield with one each. In Durham county, Sunderland takes precedence with five. The county town furnishes two, as do also Gateshead and Stockton-on-Tees, while Jarrow, Seaham Harbour, and South Shields are represented by one each. In Essex Stratford contributes one, and in Gloucestershire, two exhibitors hail from Bristol. Cheshire gives us five, one each from Birkenhead, Warrington, Dukinfield, Macclesfield, and Northwich. In Cumberland, Carlisle and Keswick furnish one a piece, and in Devon, Crewkerne and Totnes have the like representation. In Warwickshire, Birmingham comes first with 27, Southwick, Wednesbury, Dudley, Kidderminster, Redditch, and Stourbridge following with one each. Northumberland comprises 15 from Newcastle, and one each from Blyth and Morpeth. Nottingham is represented by three, and Leicester, Lincoln, and Norwich by one each.

SALTING THE NEWCASTLE TRAM LINES.—At the Newcastle police court, last week, Mr. W. Turton, of Hayfield House, Leeds, lessee of the tramways there, was summoned for having placed salt on certain streets in Newcastle. The chairman said "the magistrates were agreed that there was no injury or interruption, and no danger or annoyance to passengers," and dismissed the summons. Does anyone ever tottle up what these little jokes cost?

THE BIRMINGHAM COMPRESSED AIR POWER COMPANY.—At the last half-yearly meeting of this company the chairman reported that about 500 yards of the 24in. main were laid, and another 100 yards was being laid, and also that one compressing engine was complete, save the connections.

PUSHING BUSINESS.—Provincial gas companies and corporations should take a lesson from the London Gaslight and Coke Company who, in order to encourage the use of gas for lighting, cooking, and warming, offer to lay in services and fix meter, pipes, and fittings complete, at a rental for each house of twopence per week to approved customers residing in roads already traversed by the company's mains.

EDINBURGH WATER SUPPLY.—The fortnightly statement of the Edingburgh and District Water Trustees shows that on the 14th ult., the total quantity of water in store was 2,345,888,000 gallons, or about 112 million gallons less than on the corresponding date last year. The delivery during the fortnight was 15,088,000 gallons per day, equal to 40·73 gallons per day per head of the population supplied. The rainfall at Glencorse from 1st January to 14th ult. was 3 inches against 3·55 inches in the corresponding period of last year. At Gladhouse the fall was 2·88 inches, against 3·37 last year.

IMPORTS OF BUTTER AND MARGARINE.—From the figures published in the B Bill of Entry it appears that during January we imported 138,213 cwt. of butter as compared with 125,810 cwt. for the same month of 1887, Denmark contributing 52,097 against 35,548 cwt., France 30,534 against 40,008 cwt., Sweden 19,059 against 11,290 cwt., Germany 14,430 against 13,128 cwt., New Zealand 3,624 against 178 cwt., and the United States 1,963 against 7,846 cwt. Of margarine we imported 119,812 cwt. against 103,957 cwt., Holland alone supplying 110,607 against 99,956 cwt.

ANOTHER GOOD DIVIDEND.—The report of the India-rubber, Guttapercha, and Telegraph Works Company Limited, for the year ending December 31st states that the net profit amounted to £13,174, which, with the balance brought forward, and deducting £20,800 paid on an interim dividend, leaves a disposable balance of £30,330. The directors recommend a dividend of 10s. per share, tax free, making, with the interim dividend, a total payment for the year of 10 per cent., and leaving £9,530 to be carried forward. The company, it is stated, did an increased general business in the year; but competition and cost of raw materials also increased, and kept down the rate of profit on manufactured goods.

A BROXBURN DISPUTE AGAIN.—A conference took place yesterday at the Broxburn Oilworks between representatives of the workmen and several of the directors of the Company. The principal matter under consideration was a proposal on the part of the men that they should receive 2d. per ton of an increase. On behalf of the employers it was contended that the Broxburn miners were better paid than any other workmen engaged in similar industries elsewhere, and as the condition of the market did not warrant an increase, the directors refused to give it. Several other matters were afterwards discussed, but no decision was come to upon them.

MANURE FACTORY BURNED NEAR DUNDEE.—A destructive fire occurred yesterday evening at the premises of the Wynton Artificial Manure Company, near Baldragon, about five miles north of Dundee. The flames broke out in the stove and quickly extended to the two-storey and one-storey buildings adjoining, used respectively for the dissolving of manures and as a store. The efforts of the workmen and the Dundee fire brigade prevented fire from spreading further. A considerable quantity of machinery and chemicals was, however, destroyed. The loss is estimated at fully £2,000, but is covered by insurance.

A "CORNER" IN LEAD.—We have reason to believe that the principal lead merchants of the United States have entered into an agreement with the European producers of that metal for the "call" of their output for three years at the price of £16 per ton. Lead has not so far risen much in price since the activity in the metal market began, but under the above circumstances it appears probable that an advance may be expected.—*Times*.

AT IT AGAIN.—It is stated by a Berlin correspondent that the old and unjust insinuations against the English doctors in attendance upon the Crown Prince seem to increase in intensity in proportion as the news from San Remo is unfavourable; and Sir Morell Mackenzie and his colleague, Dr. Hovell, are peculiarly the object of uniform attack at the present moment. Nor is the injustice of the German press confined to insinuations against the English physicians, the Crown Princess herself being blamed by implication for her protection of the English specialists.

INSTITUTION OF ENGINEERS AND SHIPBUILDERS.—The fifth general meeting of the thirty-first session of the Institution of Engineers and Shipbuilders in Scotland was held recently in the Hall of the Institution, Bath Street, Glasgow. Mr. A. C. Kirk presided. Mr. James M. Storrar read a paper on "Liquid Fuel." After referring to cases in which oil is regularly used as a fuel, he described several of the furnaces, adverting to the objections made to particular appliances. Contrasting the relative cost and capabilities of coal and oil as steam producers, he contended that in many instances the pecuniary advantage was in favour of the latter. Besides, the oil, requiring less room for storage, would admit of a greater cargo being carried, and this in itself would be a financial gain. One of the more important points was as to the sufficiency of the supply. The present output of Great Britain was very much deficient, and as we could not well be dependent on a foreign Power for that which was to drive the mercantile and naval fleets, he thought that the oil producers ought to work the shale more, and place at the disposal of shipowers a sufficient supply.

THE INTERNATIONAL LAMP COMPETITION.—Last week commenced the competition in safety mineral oil lamps at St. Petersburg. Lamps burning paraffin or kerosine have been sent to the Russian Petroleum Exhibition from every part of Europe, and the competition for the £250 prize for the best safety paraffin lamp for the masses promises to be keen. England at present holds the lead, not because her lamps generally are safer than those abroad—the melancholy fact that deaths from lamp accidents in the United Kingdom number on an average nearly one a day throughout the year militates against this supposition—but because the agitation excited in this country's press and elsewhere over "The Moloch of Paraffin" has led to the invention of late of a variety of new safety lamps at Birmingham. In this respect the agitation has produced good fruit, and England has beaten every other country at the exhibiton by the number and variety of her inventions for securing safety in lamps.

THE INDIARUBBER INDUSTRY.—According to the financial report for 1887 of the Norddeutsche Gummi- und Guttapercha Waaren-Fabrik, vorm, Fonrobert and Reimann, of Berlin, no alteration of any importance took place in the condition of the trade as compared with the previous year. Export to Russia and Austria declined considerably in consequence of the high customs dues, and prices were, moreover, materially reduced by competition. During the second half of the year, sales began to strengthen. The improvement has continued into the current year. The gross profits of the factory were 77,122 mks., the net profit amounting to 10,701 mks.—*Kuhlow*.

MANURE STILL PAYS.—The report of the Briton Ferry Chemical and Manure Company Limited states that the accounts to the 31st December, 1887, show a profit of £1,889. The directors recommend a dividend of 5 per cent., tax free, £122 standing to the preliminary expenses account to be written off, and the balance of £673 to be carried forward.

WAGES IN THE BELGIAN COAL TRADE.—Some interesting statistics relating to the material condition of the working classes in Belgium have been published. In taking the coal trade wages, as here, are higher in some places than they are in others. For instance, the average daily wages of coal miners at Nöel-sart-Culpart, Gilly-Charleroi, were, in 1875, 4s.; 1882, 3s. 10d.; 1884, 3s. 2½d.; 1886, 2s. 7¾d. At Grand Conty and Spinois, at Gosselies, in 1882, 2s. 9½d.; 1884, 2s. 7d.; 1885, 2s. 4d.; whereas at Seraing, in 1875, they were 3s. 3d.; 1882, 3s.; 1884, 2s. 9d.; and 1886, 2s. 7d. The price of coal, per ton of 2,204lb., appears to have been, 1878, 6s. 3½d.; 1882, 6s. 9d.; 1884, 6s. 1½d.; and 1885, 5s. 9d.

VALUE OF HUMAN HAIR.—Everbody knows that grey, golden, and auburn hair are the most valuable colours; but the value also increases rapidly in proportion to the length. Thus, while eight-inch hair sells at about a shilling an ounce, hair thirty-six inches long realises as much as thirty shillings an ounce, and all lengths beyond this command fancy prices.

Torn to Pieces.—On Monday evening last week an engineer called Simms, in the employ of the Brentford and Southall Gas Company, was caught in the machinery at the gasworks and literary torn to pieces.

The Phospho-Guano Limited.—The 12th annual ordinary general meeting of the shareholders in this company was held on Friday, the 24th ult., at the Cannon-street Hotel, London, under the presidency of Mr. Thomas Hilton, the chairman of the company.—The directors' report stated that the result of the year's working showed a profit of £6,411. 5s. 2d., which, with £1,000. 4s. 10d. brought forward from last account, placed £7,411. 10s. to the credit of profit and loss. The item of £1,500 placed to renewal account represented the depreciation of acid chambers which had occurred, and which might have to be expended on them shortly. The greater part of the balances in agents' hands on the 31st December had since been paid, and the remainder was in course of remittance. The directors recommended a dividend of 5s. per share, free of income-tax, absorbing £5,489. 10s., leaving £1,922 to be carried forward to next account. The report was adopted, and the retiring director (the chairman) and the auditor having been duly re-elected, the meeting terminated with the usual compliment to the chairman, directors, and staff.

Margarine versus Kiel Butter.—A week ago the Lancashire and Cheshire farmers issued an important communication to the Mayor and Town Clerk of every town in the district, directing attention to the necessity for a stricter enforcement of the Margarine Act. They declare that though imports of Kiel butter, as shown by official returns, are of limited extent, large quantities are on sale everywhere, showing that margarine is now palmed off under that name, and that importers refuse to guarantee the purity of Kiel butter, pointing to a guilty knowledge.

Lubricating Oil in Bulk.—Some of the great Russian petroleum firms are said to be contemplating the export to England of refined machinery oil in bulk. Such oil has always been considered in this country too valuable to send in bulk; yet for years it has been transported in tank-cars on the Russian railways, and quite recently, a tank steamer took a cargo in bulk from Batoum to Antwerp. The principal refined lubricating oil firm in Russia is that of Shibaeff and Co., who in a few years have become as powerful in this respect as the Nobel firm has in kerosine. They manufacture yearly nearly six million gallons of oil; and it is rumoured that they contemplate putting down a pipe line of their own over the Surum Pass of the Transcaucasian Railway, thirty-five miles or so long, simply to expedite their traffic in lubricating oil towards Batoum. Not so many years ago the Russians exported only the crude lubricating oil, which firms in Europe and this country worked up into the refined article, and sold under all manner of fancy names of their own invention.

American Petroleum.—The Baku and other Russian petroleum producers have succeeded at last in preventing the importation of American petroleum. That importation reached its highest point in 1872; but only in 1879 did the imports seriously diminish. They have been falling off rapidly since that time; and last year no American oil seems to have been imported. On the other hand, Russia exported about six million gallons monthly last year, and is preparing to send more out this year. The competition between the two nations should give us cheap petroleum.

The Strontianite Industry.—Now that the difference of opinion between the Strontianite Society in Berlin and the sugar factories has been settled by composition and the price of strontianite reduced by 4 mks. per ctr., the shaft Anton in Oelde and a shaft near Ahlen are once more being worked. The stock of strontianite in hand is, however, about 8,000 tons, and large enough to satisfy the contracting purchasers for at least two years. At a large number of spots where the strontianite industry was formerly pursued, the machines and buildings have been sold, so that in these places the output of strontianite may be regarded as having been given up.

R. Bell and Co. Limited.—The Directors report of this Company for the half-year ending December 31, 1887, recommends that a dividend at the rate of 12 per cent. per annum be declared, leaving a balance of £4,081. 0s. 4d. to be carried forward to next account.

Result of a Trade Dispute.—Several thousand blast furnace workmen in Cumberland have received notices to terminate their engagements at the end of a fortnight. This action is the outcome of a dispute at Messrs. Cammell's works.

Newcastle Chemical Works Company.—At the last annual meeting of this company, Mr. C. Allhusen presiding, the chairman, in moving the adoption of the report and and accounts, said their position had been materially strengthened since they last met. The success of the salt works was established beyond doubt, and they might fairly expect at the present state of working to produce 50,000 tons before the end of this year. They were now able to produce 220 tons of 77% caustic soda weekly, a quantity which would be increased to 450 tons by about the middle of the year. The quality of the caustic soda produced nearly approached chemical purity, and could not be excelled by any other process. He had reason to believe that they were on the best possible footing to meet all competition, and that the position of the Company was absolutely impregnable.—Mr. Wilton Allhusen seconded the adoption of the report, and it was unanimously agreed to.—Mr. Christian Allhusen was unanimously re-elected a director of the company, and Messrs. Monkhouse, Goddard and Co. were re-appointed auditors.

A Good Dividend.—The Directors of Barrett's Brewery and Bottling Company (Limited) have resolved to recommend a dividend at the rate of 8 per cent. per annum for the six months ending December 31.

Portland-Cement-Fabrik, vorm. A. Giessel in Oppeln. According to the report of the above company, the quantity of cement produced by it last year amounted to 109,961 tons, against 82,656 tons in the previous year. The sales amounted to 121 tons against 89,583 tons. It is specially stated that for the current year no increase of the sales is to be expected. The prospects of the cement trade are described as satisfactory, for the larger portion of next year's production has already been contracted for at increased prices. The net profit equalled 204,244 marks.—*Kuhlow.*

How the Rich Get Richer.—Land must be a tremendous drug in the market just now, and those who are hungering and thirsting after the soil need not experience much difficulty in securing their hearts' desire by becoming landowners. A freehold farm of 570 acres in Hertfordshire has been sold in London at the upset price of £10 per acre, the purchaser of this price being the Marquis of Salisbury, whose property the farm probably adjoins. We are not told whether there was much competition for the property; but it is not surprising that large landed estates continue to grow larger when land can be picked up at the ridiculous figure—to use an auctioneer's phrase—of £10 per acre. Evidently farming in Hertfordshire is not a very lucrative pursuit.

Russia's Petroleum Industry.—Now the refining of the oil has become so perfect at Baku, that firms such as Shibaeff and Nobel can export it as a manufactured Russian product, confident that their names are a sufficient guarantee for its excellence. The Russians, who have never rejoiced at the progress of the Nobels, because they are foreigners, are very proud of the strides made by the pure-blooded Slav Shibaeffs, whose success, by the way, seems to be largely due to the fact that they have as manager V. J. Ragosine—a pioneer of the petroleum industry in Russia, who, in spite of great technical skill, failed to succeed as a manufacturer on his own account, and, by the irony of fate, has won reputation in Europe chiefly by the association of his name with an exported oil he has long since in Russia ceased to make. Unknown except in this respect abroad, he is regarded in Russia as one of the cleverest improvisers of new products out of petroleum, and has on show at the Petroleum Exhibition at St. Petersburg a "scientific collection" of petroleum products which is remarkable for its suggestive character of the potentialities of petroleum oil.

The Consequence of Breaking Pyhsical Laws.—Dr. Dallinger, F.R.S., one of the most eminent scientists of the day, whose researches and labours entitle him to the highest honour and reward, speaking at Sheffield the other day, said:—"I will yield to no man in reverence for true prayer; but I will tell you without flinching that I cannot, and I will not, pray for the removal of the smallpox scourge. It would be a mockery of God. Let us do our best, and then in baffled agony cry to God for help. But here we have not helped ourselves, and how dare we ask the Almighty to help us? Let us do our duty, act up to our knowledge, and as surely as the smallpox curse came among us by physical laws broken, so it will depart from us if we see to it that physical laws are obeyed."

Liverpool Water Scheme.—According to a return which has just been issued by the Corporation, the expenditure on the Vyrnwy water scheme up to the 31st December last amounted to £1,697,598. 15s. 4d.

Cardiff Trade.—From Cardiff our correspondent writes that the South Wales steam coal trade is somewhat firmer this week than was the case last week, the demand having increased and prices stiffened. Exports for last week were somewhat below the average, owing to the heavy snowstorms which retarded work both at the collieries and docks. Best steam is quoted at 9s. 3d., second qualities 8s. 6d., and inferior descriptions may be purchased from 8s. Small steam coal is in poor demand, and an unlimitable quantity is obtainable at 3s. 6d. House coal, owing doubtless to the extremely severe weather prevalent, is very firm, and good qualities realise 8s. 3d. to 8s. 6d. Patent fuel is weak, quotations being 8s. to 8s. 3d. Iron ore: Demand is good, Rubio ore being quoted at 11s. 9d. to 11s. 10½d. per ton, c.i.f., Cardiff or Newport. Freights from Bilbao to these ports are firm at 4s. 9d.

Worse than the Chinese "Stink Pot."—That is what Mr. Weston, the electrician, proposes to bring about. He would fire a shell, chemically charged with amyl nitrite, so that it might fall and burst upon the deck of an enemy's ship, for example. Thereupon every living thing on board would be knocked down insensible, and cast into a state of temporary paralysis. This would endure for an hour or two—sufficiently long for the mightiest ironclad to be made secure against further mischief, and her crew to be made prisoners. It is an ingenious notion, to say the least of it. As for the bad-smelling yellow liquid called amyl nitrite, there is no doubt about the power of its fumes to stupefy and make insensible. It is cheap, too, and easily obtained; notably by passing nitrous fumes into amyl alcohol, the chief constituent of fusel oil.

A Shilling Safety Lamp.—The favourite lamp of all is a new-comer, called the "Artizan Lamp," which not only has an automatic extinguisher, an appliance now considered indispensable in lamps for the masses, but the wick, moreover, is enclosed in a brass box inside the reservoir, with a porous arrangement at the bottom that allows the oil to work up to the wick, but denies the dangerous downward shoot of flame if a person ignorant of the extinguisher blows down the chimney. This is a great advantage, for several extinguisher lamps are quite dangerous if an attempt be made to extinguish the flame by blowing down the chimney. The lamp, it seems, is to be sold for a shilling, which should bring it within the reach of the masses at home; but it is pointed out that it will have to be manufactured at half this price if it is to reach the bulk of the Russian peasants, to whom even sixpence is the equivalent of a day's hard labour. However, it should be quite possible to do this, if it be made in the common plain tin to which the peasants are accustomed, decorative work being thrown away on the masses of Russia.

Trade Secrets.—Messrs. Portal, sole manufacturers of the paper on which the Bank of England notes and Government postal orders are printed, applied for and obtained from Mr. Justice Stirling an interim injunction yesterday, restraining Thomas Hine and Mr. Catchside, editor of *Paper Making*, from printing, circulating, or otherwise divulging anything connected with Messrs. Portal's business. Hine had formerly been a machinist in Portal's mill, and was aware of the secrets of the process for making the watermarks.

Scientific Agricultural Research.—Viscount Cranbrook received last week a deputation from the Sussex Association for the Improvement of Agriculture, to ask for a Government grant to assist the efforts of the association. Lord Cranbrook was accompanied by Lord John Manners. The deputation was introduced by Sir Walter Barttelot, M.P. It was stated that the association had been in existence since 1880, but that lately, owing to the depression in agriculture, the local subscriptions had fallen off. The experiments of the association and its reports, placing before farmers the values of artificial manures, had been very beneficial not only in Sussex, but in all parts of the United Kingdom. Viscount Cranbrook replied that the Agricultural Department at present had no funds at its disposal for the purpose, and changes might make anything he said now immaterial. Research was one of the things that an Agricultural Department would have to consider, but it would only be to supplement local efforts and not supply the means. Subsequently Viscount Cranbrook received a deputation of Scotch members of Parliament having a similar request to make on behalf of the Aberdeenshire Agricultural Research Association, and replied that the subject was before the Department, but that it was impossible to make promises before any money was at the disposal of the Department for the purpose indicated.

Explosion at a Paper Mill.—An alarming and disastrous explosion occurred on Saturday morning at the Albert Paper Mills, New Mills, worked by J. W. A. Turner, resulting in the wrecking of a boiler revolver, and a great portion of the works. The mill is situated at Newtown, close to the London and North Western Railway. The damage is estimated at from £5,000 to £6,000.

The Pollution of the River Aire.—The Sanitary Committee of the Leeds Town Council have just issued a report with respect to the polluted condition of the river Aire and its tributaries. An inquiry into the matter had been instituted in pursuance of a resolution of the council; a letter having been received from the Local Government Board, transmitting for consideration a copy of a petition from the Local Board of Castleford and others, alleging the seriously polluted condition of both the Aire and the Calder. The committee submit that it is important that the geographical position of Leeds in its relation to other districts, above and below the town, sending foul discharges into the Aire and its tributaries, should be carefully borne in mind; and they maintain that until the Local Authorities of these districts take active measures to prevent such discharges into the river, it will be useless to hope for any satisfactory improvement in its condition.

Temporary Water Supply for Liverpool.—Liverpool is "taking time by the forelock," and has arranged for a temporary supply of water until the Vyrnwy scheme is completed. The Widnes Local Board has decided to let the corporation have two million gallons per day from Netherby and Belle Vale, a site which the board acquired some time ago. The corporation will, however, have to put down pumping machinery at the latter place, and we believe the Worthington pumping engine has been selected for this work, as it is understood the cost of pumping will not exceed one halfpenny per thousand gallons. The same corporation has also arranged for a similar supply from St. Helens. The Liverpool Corporation is to be congratulated upon the success which has attended these negotiations, and the rapidity with which they have been commenced and completed contrast very favourably with the "masterly inactivity" which is now being pursued by Manchester.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

After the date of last report, sulphate of ammonia made a sort of spurt upwards, touching £12. 12s. 6d., and seducing some into the fancy that the mount was to be a big one; but the event showed that the staying quality was not there, and to-day most sellers would make business at £12 10s. with alacrity, although a few still think the added half crown should be got. The season of the greatest consumption being at hand, a bigger price should develop quickly, if it is to come at all, or miss the chance altogether. As regards the general chemical market we are about low water mark, and, with barely an exception, prices give signs of a break rather than anything more favourable; but probably the depression of a month is now nearing a close. There is everywhere complaint. Bleach even has given way, and caustics are the turning down, except the highest strength, which is a trifle firmer. Bichromates offer no new feature, and conference between the different makers is still going on. General prices current are:—Soda crystals, 41s. net, Tyne. Alum, in lumps, £5, less 2½ %, Glasgow. Borax, English refined, £31, and boracic acid, £46 net, Glasgow. Soda ash, 48/52° 1d., less 5 %, Tyne. Caustic soda: white, 76°, £8. 5s.; 70/72°, £6. 18s. 9d. to £7; 60/62°, £5. 18s. 9d.; and cream, 60/62°, £5. 17s. 6d., less 2½ % Liverpool. Bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6, net, Tyne. Refined alkali, 48/52° 1⅛d., less 2½ % Tyne. Saltcake, 21s. 6d., less 2½ % f.o.r., Glasgow. Bleaching powder, £7. 12s. 6d. to £7 15s., less 5 % f.o.r., Glasgow. Bichromate of potash 4½d., and of soda 3½d., less 5 % and 6 % to Scotch and English respectively. Nitrate of soda, 9s. 9d. Chlorate of potash 6d., less 5 % any port. Sulphate of ammonia £12. 10s., f.o.b., Leith. Paraffin scale: 2 1/16d. hard, 2d. soft; paraffin wax, 120° semi-refined, 2 1/16d.; paraffin spirit 5d.; burning oil 6d. to 6¼d.; lubricating oil, 885°, £6. 15s. to £7; 890/95°, £7. 15s. to £8. Sulphate of copper, £22. 10s. Imports included 5,140 tons iron ore, 2,048 barrels rosin, and 135 tons rock salt.

## THE LIVERPOOL COLOUR MARKET.

COLOURS are unaltered. Ochres: Oxfordshire £10, £12, £14 and £16; Derbyshire, 50s. to 55s.; Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d.; Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto, for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## THE LIVERPOOL MINERAL MARKET.

THE above market has maintained the improved tone reported last week. Manganese: Importations continue small, and prices are unaltered. Magnesite (containing 98 per cent. of carbonate of magnesia): No further arrivals to report this week, and prices are unchanged at 30s. to 35s. for raw lump; raw ground £6 10s. and calcined ground £10 to £11. Bauxite (Irish Hill brand) is in good demand at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: There are few arrivals, and prices are firm, with a slight advance for best qualities—80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate) continues scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6 5s.; and selected crystal ground, £8 10s. Sulphite steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. Pumice-stone: In good demand; ground, £6 10s. to £7. Iron ore still improved; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 18s to 20s. c.i.f. for forward delivery. Emerystone in demand at £5 5s. to £5 15s. for lump; and smalls, £5. Fluor and felspar quiet. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore continues to improve in demand, and prices are firm. Antimony ore, £15 to £16 for fair quality. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £10 10s.; selected lump, £12 10s. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar, 45s. for ground. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50. Plumbago: Best Ceylon lump is £25 to £35; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. Ferromanganese: 80 per cent. packed, £11 2s. 6d.; 70 per cent, packed, £10; 60 per cent. packed, £8 16s.; 50 per cent. unpacked, £7 15s.; 40 per cent. unpacked, £7 5s. Spiegel, 20 per cent., £4 12s. 6d. Silicon spiegel, 9 per cent., £8. Chrome pig, 9 to 10 per cent., £8 to £8 10s.

## LIVERPOOL CHEMICAL MARKET.

A FAIR amount of business has been done this week, but there is little or no improvement to report in prices. Soda ash 1d. up. Caustic soda: 60 % white, at £6; 60 % cream, £5 18s. 9d.; 70 % white, £7; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda: there is little improvement at 9s. 9d. to 10s.; cargoes 3d. to 6d. lower. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 15s. to £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 22s. Bichromate of potash, 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6½d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 26s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11 5s. Lump is not offering. Saltpetre: crystals, 23s.; ground, 26s. Sulphur: roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, £21. 10s. to £22. Blanc fixe, £8. 10s. Manganese: sulphate, £20; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of Calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: white, 32s.; grey, 31s. Refined borax, £30. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc (solid) £18. Hyposulphite of soda, dry and white, £5. 15s.

## MISCELLANEOUS CHEMICAL MARKET.

THE past week has not brought about any material change in the position of chemicals. The continued dulness of trade tends to make prices easier as a rule, and advances are the exception. Nitrate of soda is firm, owing to short supply on the spot, but for future delivery can be bought at 9s. 3d., c.i.f. Superphosphates, ammonia, and potash fertilisers are selling freely at current rates, both for home and foreign markets. The price of sulphate of copper is well maintained, and improvement in general trade will no doubt bring about further advance in this product. The prices of acetates and nitrate of lead are still without change. Brown acetate of lime is more freely offered, and acetate of soda is rather easier again. Aniline salt and oil are nominally unchanged, but for good orders concessions would no doubt be made. Crystal carbolic sells at full prices, and crude is still firm. Bleaching powder is selling this week at lower prices, and alkalies are all round in about the same position as last week. Chlorate of potash is 6d. per lb., and more freely offered.

## THE ALKALI TRADE.

THE alkali markets are exceedingly dull, and prices continue to fall to a lower level on account of the severe competition which exists between the ammonia-soda works and the old Leblanc. As contracts run out, buyers find themselves waited on by these two rivals, and the lion's share generally falls to the side of ammonia-soda We hear that two large alkali makers have taken licenses to use the Chance process for the recovery of sulphur from alkali waste, but whether this will enable the Leblanc soda to compete with ammonia-soda is a very open question. Bleaching powder is in fair demand, but the tendency of ordinary softwood qualities is to lower prices; hardwood being still firm at old rates.

## THE TAR PRODUCTS MARKET.

THE publication of the price offered for the Manchester tar had the effect of bringing a goodly array of country distillers on 'Change at Manchester last Tuesday, and the all-absorbing conversation generally resolved itself into the question, "Is it true?" Most distillers are afraid it will have a bad effect on the tar market, as it is the very general opinion that other gas managers will hold rather than sell at a less price than Manchester. It was also freely expressed that this was a very inopportune time to raise prices on account of the Birmingham contracts, but it was the prevalent opinion that the Birmingham Gas Committee would not face such a question as the distillation of tar on its own account. 90's benzol was mentioned as being value for 3s. 6d., and 50/90's at 2s. 7d., but these prices are only nominal. Distillers still ask the refiners high prices for crude naphtha, which some of them decline to pay. Crude carbolic is selling at 3s. 10d. to 4s., and anthracene fetches 1s. 4d½. for A quality and 1s. 1d. for B. Pitch is moving off better, but prices remain unchanged. Creosote for Lucigen light is in good demand at 2d. per gallon.

## THE SULPHATE OF AMMONIA MARKET.

THE sulphate market is fairly steady, and there would be a good demand if the weather would break for the farmers. The cry that little would be wanted for March delivery is quite unfounded, as a simple glance at the export list will show every one. From Hull and Leith alone it is evident

that very large quantities will have to be taken before the end of March, as both these ports are behind-hand with this year's deliveries. Leith market may be said to be very healthy at £12. 8s. 9d., and from £12. 7s. 6d. to £12. 8sd. 9. may be taken as the Hull price. Beckton is quoted at £12. 15s., and outside London makes have been sold at £12. 8s. 9d. to £12. 10s. 0d. Stocks at Hull are very small, and probably not not exceed 200 tons in all.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

J. H. Riley & Co., Bury, engineers and machinists, as far as regards J. Downham.

Shaw & Ridge, Burslem, earthenware manufacturers.

Bower & Thornton, Kingston-upon-Hull, lead, glass, zinc, oil, paint, colour, varnish, and general merchants.

S. Allen & Sons, Cowper-street, City-road, London, drug grinders, as far as regards S. Allen.

Weir & Williams, Howdon, Northumberland, brick and tile manufacturers.

Hennan & Froude, Newton Heath, Manchester, and Aston, near Birmingham, engineers.

Blyth Bros., Aston, Birmingham, druggists and drysalters.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Pollard, Arthur, Derby-road, South Hackney, London, late of Roman road, North Bow, London, oilman.

Cleaver, Francis Frederick, Cleaver, Francis Frederick, Jun., and Cleaver, Henry Clifton (trad.ng as F. F. Cleaver and Son), Nottingham, lace dressers, bleachers, and dyers.

Payne, Jacob Hugh, Thrapston, chemist and druggist and sauce manufacturer.

Lockwood, William, and] Leith, John, St. Helens, chemical manufacturers.

### Adjudications.

Pollard, Arthur, Derby-road, South Hackney, late of Roman road, North Bow, London, oilman.

Payne, Jacob Hugh, Thrapston, chemist and druggist and sauce manufacturer.

Pickover, Johnson, and Carruthers, David (trading as Pickover and Co.), Burnley, drysalters.

Pindar, John, Bradford, late of Apperley Bridge, Yorkshire, sanitary engineer.

Doughty, William Hall (trading as the Yorkshire Paint and Colour Company), Kingston-upon-Hull, colour manufacturers.

### First Meetings and Public Examinations.

Millington, John (trading as E. Millington and Sons), Haughton, Lancashire, hat manufacturer. March 22, Town Hall, Ashton-under-Lyne.

Cleaver, Francis Frederick, Cleaver, Francis Frederick, Jun., and Cleaver, Henry Clifton (trading as F. F. Cleaver and Sons), Nottingham, lace dressers, bleachers, and dyers. March 6, Official Receiver's Offices, Nottingham. March 16, County Court House, Nottingham.

Sharpe, Alfred, Huddersfield, leather currier. March 7, Messrs. Haigh and Sons, New-street, Huddersfield. March 12, County Court, Huddersfield.

### Notices of Dividends.

Koppel, Joseph Macgregor, Cecil-street, Strand, late of Jeffreys-road, Clapham, and South Lambeth Road, mechanical engineer. Second and final dividend of 2s., any day except Saturday, Chief Official Receiver's Office, 33, Carey-street, Lincoln's Inn, London,

Balman, Albert Richard, Wiveliscombe, Somersetshire, currier. Final Dividend of 3¾d., March 3, Official Receiver's Office, Taunton.

Wallis, Arthur Gray, Edgbaston and Birmingham, trading as the Birmingham Sanitary Association. First and final dividend of 11d., any day, 10, Newhall-street, Birmingham.

Whitaker, William, and Whitaker, Thomas (trading as the Whitaker Heating Apparatus Company), Bolton, heating apparatus makers. First and final dividend of 2s. 8¼d., first and final dividend of 7 7-9d., separate estate of W. Whitaker, and first and final dividend of 1s. 2¼d., separate estate of T. Whitaker, March 7, Official Receiver's Office, Bolton.

# New Companies.

Bovine Company Limited.—£35,000 in £1 shares.

European Pneumatic Tool Company Limited.—£60,000 in £5 shares

Gas Consumers' Benefit Company Limited.—£100,000 in £5 shares.

Hills and Thompson (Electricians).—£5,000 in £1 shares.

House to House Electric Light Supply Company Limited. £350,000 in £5 shares.

Macmahon's Electric Automatic Registering Company Limited. £20,000 in £1 shares.

New Automatic Match Supply Company Limited.—£75,000 in £1 shares.

Newfoundland Fish Drying Company Limited.—£10,000 in £10 shares.

Notting Hill Electric Lighting Company Limited.—£100,000 in £1 shares.

Patent Sanitary Cabinet Company Limited.—£20,000 in £1 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

Perforated Slabs for Steam Boiler Furnaces. J. H. Hall. 2381 Feb. 17.

Ventilators for Warm or Cold Air. H. T. Johnson. 2385. Feb. 17.

Germ Destroying Ventilator for Hospitals. H. J. Johnson. 2386. Feb. 17.

Blowing, Exhausting, and Pumping Apparatus. F. H. Stacey and H. Wilkinson. 2400. Feb. 17.

Regenerative Furnace for Steam Boilers. W. F. Simpson. 2402. Feb. 17.

Grinding Mill. G. Norman and R. A. Norman. 2403. Feb. 17.

Production of Colouring Matters. A. Ewer, P. Pick, and M. Lange. 2404. Feb. 17.

Apparatus for Heating and Drying. C. Walton. 2405. Feb. 17.

Gas Batteries. L. Mond and C. Langer. 2411. Feb. 17.

Regulating Electrical Currents. W. H. Scott and E. A. Paris. 2420. Feb. 17.

Preventing the Spread of Flames. C. J. Marshall. 2425. Feb. 17.

Preserving Articles of Food. W. Peacock. 2426. Feb. 17.

Regulating the Flow of Gas.—(Complete Specification.) D. B. Peebles. 2434. Feb. 18.

Prevention of Smoke. W. Begg. 2442. Feb, 18.

Screening Coal. C. H. Mowll. 2452. Feb. 18.

Varnishes and Lacquers. F. Crane. 2455. Feb. 18.

Raising Beer by Compressed Air. C. Grivotet. 2460. Feb. 18.

Drying Malt. J. Redgrave. 2461. Feb. 18.

Manufacture of Bottles. T. H. Williams. 2462. Feb. 18.

Dispelling Flies from Turnips.—(Complete Specification.) A. Booty. 2463. Feb. 18.

Gas and Vapour Engines.—(Complete Specification.) E. Quack. 2466. Feb. 18.

Refrigerating Apparatus. L. Perkins. 2471. Feb. 18.

An Improved Motor. A. M. Clark. 2472. Feb. 18.

Gas Cooking Apparatus. T. E. Town. 2488. Feb. 18.

Obtaining Sulphuretted Hydrogen from Oxidised Sulphur Compounds. A. M. Chance and J. F. Chance. 2495. Feb. 20.

Temperature Regulating Apparatus. G. Thomas. 2497. Feb. 20.

Manufacture of Varnishes. G. Hand-Smith. 2509. Feb. 20.

Apparatus for Evaporating Liquids. A. Chapman. 2511. Feb. 20.

Manufacture of Solid Fuel. E. W. Harding. 2513. Feb. 20.

Manufacture of Varnishes. G. Hand-Smith. 2514. Feb. 20.

Cream Settling Pans. S. Pond. 2517. Feb. 20.

Boiler Flues. G. Lansell. 2518. Feb. 20.

Lubricating Apparatus. G. F. Redfern. 2523. Feb. 20.

The Acme Wool Cleaner.—(Complete Specification.) J. Singer and M. W. Judell. 2532. Feb. 20.

Compressed Air and Water Motor. J. H. Ross. 2542. Feb. 21.

Improved Cement for Fixing Indiarubber. C. Roberts. 2546. Feb. 21.

Refrigerating Apparatus. F. Windhausen. 2548. Feb. 21.

Compressing Air. F. Windhausen. 2549. Feb. 21.

Bisulpho-Acids of Beta Napthol. T. Holliday and E. M. Mundriller. 2563. Feb. 21.

Heating and Refrigerating Apparatus. F. S. Thomas. 2568. Feb. 21.

Valve Mechanism for Air Compressors.—(Complete Specification.) W. P. Thompson. 2572. Feb. 21.

Heat Regulating Apparatus. W. P. Thompson. 2575. Feb. 21.

Aluminium Alloys.—(Complete Specification.) W. A. Baldwin. 2584. Feb. 21.

Forced Draught Furnaces. A. McInnes. 2585. Feb. 21.

Incandescent Lamps. R. Kennedy. 2586. Feb. 21.

Explosive Gas Engines. A. C. Sterry and J. Sterry. 2590. Feb. 21.

Sewer Ventilation. A. Woodhouse. 2596. Feb. 21.

Manufacture of Gas.—(Complete Specification.) H. H. Lake. 2597. Feb. 21.

Gas Burners. G. Holman. 2601. Feb. 21.

Linoleum Manufacture. H. W. Godfrey. 2603. Feb. 21.

Annealing Kilns for Slag Blocks. C. J. Dobbs. 2607. Feb. 21.

Apparatus for Filtering Wort. H. Hackmann. 2611. Feb. 21.

Manufacture of Cement. O. Hughes. 2619. Feb. 22.

Manufacture of Portland Cement. J. Roberton and J. A. Patrick. 2632. Feb. 22.

Vessels for Holding Inflammable Fluids. T. Birnbaum. 2638. Feb. 22.

Manufacture of Artificial Stone. W. E. Constable and J. Joseph. 2641. Feb. 22.

Composition for Cleaning Wall Papers. E. Johnson. 2650. Feb. 22.

Production of Colouring Matters. H. H. Lake. 2664. Feb. 22.

Apparatus for Cleansing Filters. T. Candy. 2670. Feb. 22.

Stamps for Pulverising Minerals. W. Hornsby and P. J. Ogle. 2672. Feb. 22.

Washing or Purifying Gas. S. Chandler, jun., and J. Chandler. 2675. Feb. 22.

Incandescent Lamps. A. F. St. George and C. R. Bonne. 2689. Feb. 23.

Gauging Water by Electricity. L. Berry. 2690. Feb. 23.

Collecting Dust. G. F. Thompson. 2700. Feb. 23.

Gas Fires.—(Complete Specification.) T. Fletcher and A. Clare. 2702. Feb. 23.

Sounding at Sea by Electricity.—(Complete Specification.) F. Hargrave. 2703. Feb. 23.

Friction Dynamometers. G. E. Coupe. 2707. Feb. 23.

Regulating Draughts in Chimneys. J. Gowland. 2711. Feb. 23.

Cartridges for Blasting. R. H. Heenan. 2721. Feb. 23.

Magnesium Lamps. A. James. 2730. Feb. 23.

Apparatus for Purifying Crude Spirit. W. S. Squire. 2735. Feb. 23.

# PRICES CURRENT. [THURSDAY, Mar. 1, 18

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are f.o.r. at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 9 | 3 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 11 | 6 |
| Chromic 82 % ... ... ... ... ... per lb. | 0 | 0 | 6 |
| Fluoric ... ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ... per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 3½ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) ... ... ... per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 5 | 0 |
| ,, ( ,, 150°) ... ... ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) ... ... ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 6¾ |
| Arsenic, white powdered... ... ... ... per ton | 10 | 12 | 6 |
| Alum (loose lump) ... ... ... ... ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, ·880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 48 | 0 | 0 |
| ,, ,, (pure) ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 10 | 0 |
| ,, ,, (grey), Hull ... ... ,, | 12 | 8 | 9 |
| Aniline Oil (pure) ... ... ... ... ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ... ... ... ... ,, | 0 | 0 | 8½ |
| Antimony ... ... ... ... ... ... ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... ... ... ... ... per ton | 8 | 0 | 0 |
| ,, Carbonate (native) ... ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, .... ...per gallon | 0 | 3 | 6 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 3 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 4 |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 78 | 17 | 6 |
| ,, Sulphate ... ... ... ... ... ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 70 | 0 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 1 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 16 | 5 | 0 |
| ,, Litharge Flake, ex ship ... ... ,, | 16 | 10 | 0 |
| ,, Acetate (white) ... ... ... ... ,, | 27 | 10 | 0 |
| ,, ,, (brown) ... ... ... ... ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 0 | 0 |
| ,, Nitrate ... ... ... ... ... ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 9 | 12 | 6 |
| ,, ,, (grey) ... ... ... ... ,, | 13 | 15 | 0 |

| | £ | s. |
|---|---|---|
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 |
| ,, Chloride ... ... ... ... per ton | 2 | 7 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 |
| Manganese, Sulphate ... ... ... ... ,, | 18 | 10 |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 5 |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 12 |
| Methylated Spirit, 60° O.P. ... ... ...per gallon | 0 | 2 |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 |
| ,, ,, Miscible, 60° O.P. ... ,, | 0 | 5 |
| **Oils:—** | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 2 |
| Cotton-seed ... ... ... ... ... ... per ton | 20 | 10 |
| Linseed ... ... ... ... ... ... ... ,, | 19 | 10 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 |
| ,, American ... ... ... ... ,, | 0 | 0 |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 16 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 15 |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 |
| ,, Permanganate ... ... ... ,, | 4 | 5 |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 |
| ,, Sulphate, 90 % ... ... ... per ton | 9 | 15 |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 5 |
| Silver (metal) ... ... ... ... ... ... per oz. | 0 | 3 |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 4 | 0 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 11 |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 7 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 |
| ,, Acetate (ex ship) ... ... ... ,, | 20 | 0 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 |
| ,, Borate (Borax) ... ... ... ... per ton. | 31 | 0 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 |
| ,, Hydrate (77 % Caustic Soda)... per ton | 8 | 7 |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 10 |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 15 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 16 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 15 |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 5 |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 10 |
| ,, Manganate, 30/33 ... ... ... ,, | 10 | 5 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 |
| ,, Nitrite, 98% ... ... ... ... per ton | 28 | 0 |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 1 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 12 |
| ,, Sulphide ... ... ... ... ... ,, | 8 | 15 |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 5 |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 |
| Sugar, Beet ... ... ... ... ... per cwt. | 0 | 14 |
| ,, Cane ... ... ... ... ... ... ,, | 0 | 18 |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 |
| ,, Barium ... ... ... ... ,, | 0 | 0 |
| ,, Copper, 60% ... ... ,, | 0 | 0 |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 5 |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 2 |
| Tallow ... ... ... ... ... ... ... ,, | 26 | 15 |
| Tin (metal) ... ... ... ... ... ... ,, | 160 | 0 |
| ,, Crystals ... ... ... ... ... ... per lb. | 0 | 0 |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 19 | 7 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 |

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**SATURDAY, March 10, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

**DAVIS & CO., 42, John Dalton Street, MANCHESTER.**

Our Registered Telegraphic Address is—

**"Expert, Manchester."**

The yearly Subscription, commencing at any date, to the *Chemical Trade Journal*,—payable in advance,—including postage to any part of the world, is 10s. 6d. Readers will oblige by making their remittances for subscriptions by Postal or Post Office Order, crossed. The charge for a Postal Order for 10s. 6d. is one penny.

Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.

## SPECIAL NOTICE.

IT is our intention at an early date to introduce a new feature in the pages of the *Chemical Trade Journal*—one that we feel sure will commend itself to our numerous circle of readers, seeing that nothing of the kind has ever been attempted before in connection with the Chemical and Allied Industries.

We propose to issue a weekly summary of the chemicals and articles of a kindred nature exported from and imported to the principal seaports in the United Kingdom, commencing in the first instance with the five following ports, viz., London, Liverpool, Glasgow, Hull (with the Humber ports), and Newcastle-on-Tyne.

Those of our readers who are acquainted with the sources of information available for the purpose, will not need to be told of the vast amount of labour, not to mention expense, involved in the proposed compilation, but believing as we do that the information will be of the greatest practical value to our subscribers, we shall spare no pains in compiling and presenting in our pages a handy and reliable record from week to week.

Any suggestions that our subscribers may have to offer in connection with this matter will be gladly received and duly considered.

## THE INSTITUTE OF CHEMISTRY.

ANNUAL GENERAL MEETING.

THE annual meeting of this body was held on Thursday, March 1, at the rooms of the Chemical Society, Burlington House, the attendance of Fellows being very large. The chair was occupied by Dr. Odling. Mr. David Howard (treasurer) presented the balance-sheet, which showed a balance of income over expenditure, notwithstanding that £225 had been paid off for expenses in obtaining the charter.

The accounts having been unanimously passed, the PRESIDENT rose to deliver his address. He referred in the first place to the by-laws, which had only just been sanctioned when he last addressed the members, and to the charter as defining the objects of the Institute. The principal object stated in the preamble was the elevation of the profession of the consulting and analytical chemist, on the faith of which the charter was granted. The Institute was now fairly started on its way, and it rested with the members to carry out the objects they had set before them, and to determine whether the Institute should take a prominent place amongst other scientific and professional societies. Every such society had the special conditions of its own craft to consider, and its own special difficulties to contend with; but all professional societies had this in common, and they owed their ultimate success and influence in a great measure to those who took a high view of their profession, believed in it, and who worked for its future. Self-interest could never be excluded from the motives which operated with mankind, but there was a difference between an intelligent and widely sympathetic self-interest which was consistent with a desire to achieve the common good, and a low, confined, narrow self-interest, which looked only to present and purely personal gain. The Institute of Chemistry was never intended to confer advantages of a purely personal kind, and by the acceptance of the charter they were pledged to make it subservient to public and not private ends.

It differed from the majority of other professional societies in having a purely democratic organisation, for the majority had been, and not a few still were oligarchic, founded and fostered by men of mark in their respective callings,—fully conscious of their own attainments,—earnest and high-minded, but perhaps a little out of sympathy with the rank and file of their brethren, who in most cases had had to fight their way to recognition. In founding and conducting the Institute of Chemistry this had been almost entirely reversed, for though not without the co-operation of several prominent chemists, it was originated mainly by the younger and less eminent men, and the idea from the first was the comprehension of all engaged in any branch of chemical work on a

footing of corporate equality. It was with this idea that as soon as the by-laws were passed the announcement was made to all chemists who were properly qualified under the charter would be welcomed into the society.

This step had been objected to by some, but it was felt that the charter was intended for the benefit of the whole profession, and that any attempt at exclusiveness would be both unwise and unjustifiable. The result was to add about two hundred new members to their numbers, and thus reinforced, it behoved them all to bear in mind the object of their society, and to show to the members that a self-governing Institute could be equally as mindful of the real permanent interests of the profession as the oligarchic few, who in so many instances constituted the governing bodies of other professional societies. He then dealt at some length on the constitution of the council, and the rules under which one-third of the vice-presidents and ordinary members of council became in each year ineligible for re-election, and the mode of nomination partly by council and partly by the members, and the various considerations which weighed with the council in selecting names for recommendation to the members. Of course the result of such a mode of selection, though it could always be justified might not always justify itself on mere inspection; but on the whole he believed the system was a very good one, and it had not been found in practice that there had been any party spirit or any pronounced difference of view between those nominated by the council and those nominated by the outside members. Even if such a thing should occur, it must be remembered that a right of appeal lay to the general body: the council was only the administrative and executive body, and it was open to any Fellow to bring under the formal consideration of the council any matter in which he was interested, and any twenty Fellows could cause a general meeting to be called, and a resolution passed at such a meeting was binding on the council.

It was for the members to consider whether this was not a better mode of proceeding than to attempt to pack the council with the representatives of a certain opinion. Circumstances were no doubt conceivable in which the members might be warranted in a more or less wholesale rejection of the council list, but he thought such a proceeding would be justifiable only as a last resource, and on some specific grounds.

He referred to this topic because of his strong feelings, that it was a matter of paramount importance to maintain a sense of common interest and purpose between the council and the Fellows at large. It was now in the power of the general body to make the Institute anything they pleased; they might allow it to degenerate into a sort of very inefficient trades union, or they might more wisely resolve on its being so conducted as to raise it to a position of influence and reputation not inferior to that of any other professional society, though such a result could not be achieved without continuous effort, and possibly a little self-sacrifice.

Having referred to the great increase in the amount of professional work during the last twenty-five years, and suggested that though in the past very much of it had fallen into the hands of a few eminent men, it would in the future be much more evenly distributed amongst men who were all recognised as standing on much the same professional level; but, he added, that those who remained outside of the Institute, however competent they might be, would inevitably find themselves more or less handicapped in the race. On the other hand, they were all liable at times to find themselves in circumstances of professional difficulty and anxiety, when the sympathy and support they could claim from such a society would be of very great assistance.

The great means of elevating the profession was to insist on a thoroughly efficient training from all candidates for admission. To what extent that training could or could not be satisfactorily afforded in private laboratories was a question on which he would forbear to give any opinion, as it had not come under the notice of the council during his term of office, but it was likely to do so shortly, and he was quite sure they would deal with it most carefully, in a spirit of liberality, and with a desire to do what was best for the Institute and its present and prospective members. They must all recognise the warm interest which had been taken in the Institute by professors and teachers at the various colleges and universities, who had done it good service by recommending their pupils to become associates. The opinion was becoming more and more prevalent that mere examination did not of itself afford a satisfactory guarantee of knowledge, and probably some evidence that a certain amount of laboratory work had been gone through, would be required in addition to examination.

The suggestion had been frequently made that both with a view of bringing members more frequently together and also of advancing knowledge, meetings should be occasionally held, at which subjects of interest might be brought forward and discussed, and the new council would probably consider this matter.

The address concluded with a reference to the merits of Dr. James Bell, who had been nominated by the council for the office of president for the ensuing year, and with a graceful tribute to Professor Frankland and Sir Frederick Abel, who had preceded him in the presidential chair.

Mr. FRISWELL moved a vote of thanks to the president for his address, coupled with a request that it might be printed and circulated amongst the members.

Mr. THOS. TYRER, in seconding the motion, congratulated the president on the able defence which he had given of the constitution of the Institute, which was peculiarly appropriate at the present time.

Mr. OTTO HEHNER asked if there would be any opportunity of offering any reply to what he might term the controvertial portion of the address on the motion for the adoption of the council's report.

The PRESIDENT said he did not see how the matters Mr. Hehner referred to could be discussed in connection with the report.

Mr. W. THOMSON said that as a circular to which the president had alluded bore his name, he would like to say that no discourtesy either to the president or to any member of the council was intended by it. He joined with the other members in heartily thanking the president for his past services to the Institute and for his address. He said, however, that the action which had been taken by himself and his coadjutors were not for personal or party motives, but for what they believed to be absolutely necessary for the future success of the Institute, and he thought that any party of outside members were quite as likely to be right in their judgment as to who should constitute the council as the members of that body themselves, and he saw no reason why the general body of members should not employ their rights of voting in any direction they thought proper.

Mr. FRISWELL then put the motion, which was carried unanimously.

The PRESIDENT in returning thanks for the kindness with which he had always been received, expressed the hope that any matter on which a difference of opinion had been manifested during the last week or two would not give rise to any feelings of irritation, but would be left to the determination of the council in the regular manner. He then called on the secretary to read the report of the council, saying it was the intention in future to make the report rather more full and complete, and to circulate it previous to the annual meeting.

The SECRETARY then read in a few words the report, which stated that 158 Fellows and 22 Associates had been admitted during the year, a large proportion without examination. There were now 544 Fellows and 45 Associates on the roll, and 57 Fellows had been elected who had not yet taken up their Fellowship.

Mr. HEHNER moved the rejection of the report as a matter of form, in order to lay before the meeting some considerations of an opposite character to those enunciated by the president.

The PRESIDENT said he must ask Mr. Hehner to speak to the report only.

Mr. HEHNER said he would move the rejection of the report on the ground that in the opinion of the meeting, the absence of all statements in it with regard to the future admission of members was not satisfactory, and that the report be referred back to the council for amendment. He was about to state his reasons for this motion, when

The PRESIDENT said he must ask Mr. Hehner to confine his remarks to the report. If he had any special matter to bring forward it was competent for him to bring it before the council, and if he was not satisfied with their decision he could take means to have a general meeting called to discuss it.

Mr. CASSAL asked if it would be in order at any future stage to raise the question, which he had no doubt many members had come to discuss.

The PRESIDENT said if it had been desired to bring forward any particular subject twenty-one days' notice ought to have been given, and then the members would have come prepared, but according to the by-laws they could only discuss business of which notice had been given. There was

no desire whatever to "burke" this question, but it could not be taken into consideration now because no notice had been given.

Mr. HEHNER said he would like to confine his remarks to the report, but it was so very meagre there was nothing to be said about it. (Loud laughter.)

Mr. CASSAL submitted that a motion to reject the report was equivalent to a vote of censure on the council, and asked if such a motion was not in order at a general meeting.

The PRESIDENT said he thought if it really was desired to pass a vote of censure on the council it should be done in a straightforward manner, and on due notice.

Mr. HEHNER said there was only one opportunity a year for discussing matters affecting members.

The PRESIDENT said he did not wish to enter into any argument, but if Mr. Hehner felt that this matter was so important he could easily have given notice of it.

After some further discussion, in which the president adhered to his previous ruling,

A MEMBER asked the president if he would give an assurance that the matter in question would not be fully decided by the council before it had been brought before the general body. It was evident that what most of them believed to be the intentions of the council would meet with considerable opposition. He held an entirely independent position, and his only desire was for the general prosperity of the Institute, but he did not think this would be secured by the council laying down any regulation which was objectionable to a large number of the members.

Mr. SLATER said he understood this burning question was to be discussed, and he had come two hundred miles on purpose.

The PRESIDENT said the matter referred to had not been *formally* before the council during the five years he had held office; incidental observations had been made upon it, and it would shortly come forward for discussion. He could assure them personally that there was every desire to consider it in a liberal spirit, and he hoped the members would wait until a decision had been arrived at. It would not be the province of the council to call a general meeting to confirm their decision, but if the members were dissatisfied with it, they could call a meeting at any time to consider it, and the decision of such a meeting the council would be bound to carry into effect.

Mr. LLOYD asked if the report next year would be circulated in time for members to give notice of a resolution with regard to it.

The PRESIDENT said this seemed reasonable, but he could not give a definite answer offhand.

Mr. CASSAL thereupon moved the adjournment of the meeting, upon which

The PRESIDENT pointed out that nothing could be done at an adjourned meeting which could not be done then, and declined to allow Mr. Cassal to go into any details or general questions in moving the adjournment. After some further discussion, the motion for the adoption of the report was carried *nem. con.*

Messrs. Holmes and Clayton were then appointed scrutators, and having received the voting papers, retired to count them.

During the absence of the scrutators, Messrs. Frankland, Odling, Russell, and Abel were elected censors for the ensuing year, and Messrs. Helm, Cassal, and Bernard Dyer as auditors.

A vote of thanks was then passed to the council, on the motion of Mr. Otto Hehner, seconded by Mr. Spiller; and a similar compliment was paid to the auditors.

The PRESIDENT then announced that the scrutators had reported that the council list had been carried; that was the only official announcement he had to make.

Mr. HEHNER requested to know by what majority the list was carried, as it was very desirable that Fellows should know whether there was any substantial feeling at the bottom of the movement. The president objected officially to mention it, but handed the paper to Mr. Hehner, who read out—

| | |
|---|---|
| Votes for the council list | 158 |
| Votes opposed to the council list | 105 |
| Invalid papers | 9 |

Three of which were for and six against the council list.

The following list represents the council for the ensuing year:—

PRESIDENT:

James Bell, Ph.D., D.Sc., F.R.S., &c.

VICE-PRESIDENTS:

Sir Frederick Abel, C.B., F.R.S., &c.; H. E. Armstrong, Ph.D., F.R.S., &c.; Sir Charles A. Cameron, M.D., &c.; J. Ferguson, M.A., F.C.S.; W. Odling, M.A., M.B., F.R.S., &c.; C. M. Tidy, M.B., F.C.S., &c.

TREASURER:

David Howard, F.C.S.

ORDINARY MEMBERS OF THE COUNCIL:

A. H. Allen, F.C.S.; A. J. Bernays, Ph.D., F.C.S.; H. T. Brown, F.C.S.; M. Carteighe, F.C.S.; F. Clowes, D.Sc., F.C.S.; T. Fairley, F.R.S.E., F.C.S.; A. E. Fletcher; P. F. Frankland, Ph.D., F.C.S.; W. Harkness, F.C.S.; Otto Hehner, F.C.S.; D. B. Hewitt, M.D.; F. R. Japp, M.A., Ph.D., F.R.S., &c.; George H. Makins, F.C.S.; R. Meldola, F.R.S., &c.; B. E. R. Newlands, F.C.S.; C. O'Sullivan, F.R.S., &c.; J. Pattinson, F.C.S.; W. Ramsay, Ph.D., F.C.S.; E. Riley, F.C.S.; R. W. Smith, M.D., D.Sc.; T. Stevenson, M.D., F.C.S.; A. Norman Tate, F.C.S.; J. M. Thomson, F.C.S., &c.; W. Thomson, F.C.S.; W. A. Tilden, D.Sc., F.R.S., &c.; T. Tyrer, F.C.S.; R. Warington, F.C.S.

Mr. BERNARD DYER asked whether the voting papers returned to the secretary without the names of the senders being written on the envelopes in which they were enclosed rendered them invalid, to which the president replied that they were invalid.

Mr. A. H. ALLEN read out the by-laws respecting the voting, in which nothing was mentioned regarding the names of the senders being required to be written on the envelopes.

The PRESIDENT replied that he had taken legal advice upon the matter, and was acting upon it.

The proceedings then terminated, having lasted considerably over two hours.

## THE MANUFACTURE OF CHLORIDE OF SULPHUR.

IN a previous article we described an analytical process in which chloride of sulphur ($S_2 Cl_2$) was employed, it may therefore be interesting to some of our readers to know something more about this chemical compound, and how it may be prepared.

The monochloride of sulphur is a reddish yellow liquid, fuming strongly in the air, and is decomposed by water into sulphur, sulphurous acid, and hydrochloric acid. Its specific gravity is 1·68 (136° Tw.), and it boils at 139° C. It dissolves sulphur readily, and is largely employed for the vulcanisation of indiarubber, and for the manufacture of indiarubber substitute.

Most works on chemistry, even those of more recent date, tell us how chloride of sulphur *may be* prepared, but few save poor neglected Gmelin, tell us how it actually is made. There is no need for bringing the sulphur in the state of vapour in contact with dry chlorine gas, as is usually mentioned, the operation is much more simple. The articles required are *dry* flowers of sulphur and *dry* chlorine gas. Roughly, it may be taken that flowers of sulphur will absorb their own weight of chlorine gas, so that to make, say, 150 grammes of chloride of sulphur we should require:—

| | |
|---|---|
| Peroxide of manganese (70 %) | 150 grammes. |
| Muriatic acid (30° Tw.) | 600 ,, |
| Flowers of sulphur (in excess) | 90 ,, |

In the laboratory the operation may be carried out as follows: Lightly fill a Wolff's bottle with flowers of sulphur (90 grammes), fitted with a tube reaching nearly to the bottom of the bottle, and connect the outlet with another bottle of sulphur fitted similarly. Now evolve the chlorine slowly from the mixture of manganese peroxide and muriatic acid, and after passing it through a cooling tube to deposit as much water and vapour of hydrochloric acid as possible, dry it thoroughly by passing it through a cylinder filled with coke moistened with strong sulphuric acid (sp. gr. 1·845). This dry chlorine must now be turned through the sulphur contained in the Wolff's bottles, standing by preference in iced water to keep the contents cool. The chlorine is rapidly absorbed by the sulphur, which becomes liquefied as the absorption proceeds, and when the whole contents of the first bottle have become liquefied the operation may be stopped, and the contents set aside for purification.

The liquid obtained by this method is sometimes sold as such to the indiarubber manufacturers; but as it contains a very large quantity of free sulphur dissolved in it, it has in times gone by caused much annoyance to the manufacturer by producing an objectionable "bloom" on some descriptions of waterproofed goods, it has therefore become customary to distil it, and so to free it from dissolved sulphur. This is done in a large glass retort heated either by a large "rose burner" or by a naked fire, the former being the preferable method. In the laboratory this operation is easily performed, but in the works and on the large scale it requires more care.

In manufacturing this substance on the large scale, the operations may be strictly conducted on the foregoing lines, and it will be seen that the construction of the plant presents no new difficulties to the chemical engineer.

## WEST-KNIGHT'S AND GALL'S PROCESS OF EXTRACTING CARBOLIC ACID.

IT is usual in manufacturing carbolic acid to use a solution of caustic soda to separate the phenols from the neutral oils and naphthaline with which they are associated in middle oil obtained on the distillation of tar. Various concentrations of the caustic soda solution are used, according to the nature of the oil or the requirements and aims of the manufacturer. Every effort to replace the comparatively costly soda by lime has hitherto failed, the reasons for this failure being that lime although it readily combines with the phenols, forms a compound which is insoluble in water, so that it cannot be separated from the oil by washing with water.

The lime compound also, although it is insoluble in the neutral oils, forms with them a magma, which it is impossible to filter or separate by subsidence or any ordinary means.

This difficulty has been overcome by Messrs. West, Knight, and Gall, who find that the lime compound of phenols is entirely decomposed by a solution of sulphate of soda with the production of a soluble compound of the phenols with soda, which can be separated in the ordinary way by drawing off the liquor from the bottom, and an insoluble sulphate of lime which remains in the oil and can readily be filtered from it.

The carbolate of soda liquor obtained in this way is identical with that obtained when caustic soda is used, so that the neutralising with sulphuric acid and separating of carbolic acid are carried on as usual, leaving as a residuum sulphate of soda liquor, which can be used over again, so that sulphate of soda although it is used in the process is not expended, being re-formed in the liquor at the end of the operation.

The advantages claimed by the inventors for this process are numerous. In the first place the cost is much reduced, as the cost of lime is about one-tenth that of soda; secondly, there is no residual liquor to be got rid of, and this is no inconsiderable advantage where large quantities are produced daily, and cannot be discharged directly into a stream on account of its poisonous nature destroying fish and polluting the stream; crystals of sulphate of soda do not accumulate, in fact the liquor requires occasionally renewing, so that old stocks of waste crystals can be gradually reduced; thirdly, there is a greater yield of carbolic acid, as the liquor which at the end of the operation is a saturated solution of carbolic acid is not thrown away but used over again, and in the next operation the carbolic acid it contains is recovered. Fourthly, the carbolic acid obtained is of better quality, as it contains practically no naphthaline nor neutral oils, because a solution of sulphate of soda has no solvent action on those substances, and it is well known caustic soda has.

Very slight alterations of existing plant are required, and the operations being of a similar nature to those at present in use, experienced workmen will have no difficulty in working the new process.

The process is already in successful operation at the Shelford Chemical Company's works, and gives entire satisfaction, the result of the practical working fully bearing out the statements made by the inventors.

The process simply consists in churning the carbolic oil with a hot solution of sulphate of soda, to which a quantity of slaked or burnt lime, equivalent to the carbolic acid to be extracted, has been added, then allowing the whole to settle: after thorough settlement the liquor is drawn off from the bottom and strained through canvas, if necessary. If a full equivalent of lime and a slight excess of sulphate of soda have been used, the whole of the carbolic acid will be found in the liquid. A simple laboratory experiment will quickly demonstrate this. The residual oil, which contains the greater part of the sulphate of lime, can be filtered through canvas with ease, as the sulphate is in such a state as to allow the filtration to proceed rapidly.

After obtaining the carbolic acid by acidifying the liquor with sulphuric acid in the ordinary way, the sulphate of soda liquor is neutralised with carbonate or caustic soda, and is ready for use over again with a fresh quantity of carbolic oil and lime.

## SPONTANEOUS COMBUSTION OF COTTON.

THERE are several books of instruction on the stowage, handling, and pressing of cotton, and all of them that have been brought under our observation treat this fibre as highly susceptible to take fire in the heated hold of a ship, and especially if brought near any oil or grease: Dr. Dupré has, we think, conclusively established the fact that cotton cannot be set on fire by inherent vice. Mr. Laslett, chief surveyor to the Board of Trade, at the recent investigation, stated that from inquiries he had made he had traced a number of samples of matches in cotton bales, and he found that these matches were generally the same as those used all over the United States. The matches, he said, were found in clusters sometimes; they were sulphur matches, and remarkably easy to ignite. He was almost convinced that the matches came from the men who were engaged in either packing or loading the cotton. He had examined the various portions of cotton as they arrived from the United States and other places; but his information is not sufficiently explicit to be of any value whatever. Instead of second-hand charges we want reliable testimony. If matches have been discovered in bales, the name of the ship, her port of loading, date of arrival, and number or mark on the bale should be given. There are so many practical jokers to be met with that the mere assertion of some man who declares he has come across lucifer matches, such as are sold in the United States and brought to Liverpool by seamen and passengers, is not worth much. We invite Mr. Laslett to prove his theory of bales being consumed by inflammable matches. The evidence of Dr. Dupré is, however, more practical and trustworthy. He had been employed at the instance of the Board of Trade in making experiments, but could not produce spontaneous combustion under any conditions. He had tried to produce spontaneous heating even, and in every case had absolutely failed. He had kept the cotton wet and dry in specially constructed chambers; he had a thermometer in the cotton and one outside the warm chamber, and he never noticed any increase of temperature inside the cotton. It was next to impossible to keep a constant temperature for any length of time, but the temperature of the cotton rose and fell with that of the outer temperature. He tried thousands of experiments, keeping them going for a fortnight, but never noticed the slightest effect. Oiled cotton, he said, was liable to spontaneous combustion; but it was the oil in that case. The experiments he had made had led him to the conclusion that certain circumstances must be complied with in order to bring about ignition or spontaneous heating. They were chiefly these: First, the cotton must be fairly well oiled. If there was very little oil, it did not lead to spontaneous ignition, and the amount of heat it was capable of producing was not sufficient to bring that about. In the second place, there must be a tolerably free access of air. To illustrate that, he had made experiments by wrapping up a piece of well oiled cotton in a ball of loose cotton. He also took as near as possible the same amount of oiled cotton and wrapped it up in the same amount of cotton, which he pressed with his hand, and kept it compressed with string. Under those conditions he found that the oiled cotton wrapped inside the loose cotton took fire spontaneously when he kept it at a temperature of 212° Fahrenheit for four or five hours, whereas the oiled cotton in the compressed ball showed no signs of combustion whatever, even after twelve or twenty-four hours. Those experiments seem perfectly conclusive. It would be impossible to get 212° of heat in the hold of a ship without heat in the shape of dried steam, gas, or fire. The oil theory must consequently be abandoned. Cotton saturated with oil and kept at a temperature of 100° for a week failed to ignite. Dr. Dupré, in reply to a question as to whether cotton would be liable to burn if placed near a

eamer's boilers, replied that it would require a temperature 900° to 1,000° to cause a fire, and that bales might be put the boilers with impunity, though it might not be a wise ing to do. He had tried to set cotton ablaze by sparks om a steel file and flint, but failed to generate mbustion. Cotton must be charred before a spark ill ignite it. As regards the lucifers he was told that e matches commonly found in cotton bales were much ore sensitive to friction than ordinary matches. The bale ken from the *Hawarden* and sent up to him was mixed up ith so much burnt wood, probably from the sides of the ip, that he could not find any chemical evidence of the obable cause of fire. He found one match partially mt; also two or three spills—thin shavings of wood used r pipe lights—partially burnt. The match was more like English match than one of those commonly used in merica. It was scarcely possible to conceive that the atch which did the mischief could remain to tell the tale; ut it showed at any rate how careless were the men who ad to do with this work. In all probability the matches ever came from America, and, as lucifers do not ignite ithout the application of friction, we may set aside this isleading will-o'-the-wisp. Cotton will not burst out into flame when a match is struck on it. The actual cause of cotton fires must be looked for in other directions altogether. We could enumerate nineteen reasons why cotton should be burnt. Money is made by these conflagrations. Mr. Stanley Metcalf, secretary of the North of England Indemnity Association, in an affidavit produced at the inquiry by Mr. Gough, of the solicitor's office in the Board of Trade, with reference to the ship *Horseguards* mentioned that the commission of 2½ per cent. for collecting the general average was, according to usage, a proper charge. In practice the charge was customary, and was an emolument of the ship's agent, whether he or the adjuster made the collection. Then Mr. Metcalf deposed that custody commission was a charge made by ships' agents at the shipping ports or ports of refuge, and for which he had known agents to claim £900 or £1,000 for services which would have been amply covered by a fee of five or six guineas. Upon this question the witness obtained the opinion of a leading solicitor at New York, and after dealing with the subject at length, that gentleman made the forcible remark, "I doubt very much whether the brokers to whom you refer, if doing business in New York would have made such a charge unless the ocean lay between them and their indignant and unfortunate principals." The custody commission, therefore, offered a strong inducement to the ship's agents to influence the master to consent to the discharging of his cargo; and the 2½ per cent. commission for collecting general and special charges was another strong inducement to a ship's agent to have a cargo broken up at the port of distress. In corroboration of that statement, Capt. Reaveley, of the *Resolute* was called, and he certified that the cost incurred by the owners of that ship in consequence of the fire was $28,000, of which $5,000 was claimed for "custody commission." He spoke of the negro labourers at Savannah who loaded cotton ships, carrying lucifer matches stuck behind their ears. This dangerous practice ought not to be allowed; but if matches fell into the hold they would not set a cargo on fire, unless they gave forth flames. Detection would or should be almost immediate, if proper supervision is exercised in loading. But cotton takes fire in warehouses, on wharves, and at presses, and in a most suspicious manner; and there are so many people to reap advantages from fires, that we repeat our former suggestion, to the effect that the United States Government should engage experts to probe the whole affair.

## LAWS FOR THE PREVENTION OF ADULTERATION OF MANURES IN BELGIUM.

ART. 1. Every delivery of materials intended for manure, whether simple or compound, containing one of the principal fertilising agents, nitrogen, phosphoric acid, or potash, shall be accompanied by an invoice or delivery note.

If the invoice cannot be made at the same time as the delivery, it must be despatched within the time indicated by the Royal Decree.

It shall be certified exactly by the seller or assignor, and shall contain the following information:—

(1) The name or the nature of the matter sold, and also whether it is a simple or a compound manure.

(2) Its component parts.

This shall express the name and the quantity per cent. of each of the essential fertilising principles, and also the chemical state in which they are to be found; the form and the manner in which they shall be determined being indicated by Royal Decree.

If the delivery is of oil-cake, the invoice shall express, after the manner indicated by the Decree Royal, the nature of the seed or seeds of which it is made.

Art. 2. The foregoing article is not applicable to deliveries of fertilising materials coming from natural sources of the farm or of spontaneous products of the soil, nor to products from ashpits, ashes, soot, household refuse, refuse from markets or abbatoirs, or agricultural industry, if the different matters are sold under their proper names and in their natural states.

Art. 3. Every infraction of Art. 1 shall be punished by a fine of from 1 to 25 francs, and an imprisonment from one to seven days, or one of these sentences only.

In case of a repetition of the offence during the year of the last conviction for the same infraction these punishments may be raised to double.

Art. 4. The seller or assignor is allowed to prove by all legal means that he has conformed to Art. 1.

Art. 5. Anyone who shall have deceived the buyer, either as to the elements of the mixture, or by the employment of a name already applied to another fertilising mixture, shall be punished by a fine of from 100 to 2,000 francs and an imprisonment of fifteen days to six months, or one of these punishments only.

These punishments shall also be applicable to those who shall have falsified a sample in virtue of the present law; also to those who at the time of delivery of oil-cakes shall have attempted to deceive the buyer as to their composition.

In case the offence be repeated during two years from the last conviction for a similar infraction of the law, these punishments may be raised to double.

Art. 6. In addition to a description of the designations to employ relating to the analysis and mixture of manures, a Royal Decree shall determine the means of application and the mode of control necessary to ensure the execution of the present law.

Art. 7. The Government is authorised to prescribe the necessary measures in order that matters coming within the scope of the present law may not be imported without being accompanied by the invoice, delivery note or declaration prescribed by the first article, or of a written equivalent.

## THE "DEFLECTOR" MINERS' SAFETY LAMP.

IT is well known that, whatever safety the original Davy lamp and its congeners possess, that safety, says the *Times*, is only comparative and not absolute. This remark also holds good with regard to the later and improved forms of this typical miners' light. This is due to the circumstance that collieries are now worked under conditions widely differing from those which obtained when the Davy lamp was first placed in the miners' hands. Improvements have from time to time been made in this lamp, and have largely met the requirements of advanced colliery practice. Finality, however, does not appear to have been reached, nor perfect safety insured, even in the best class of miners' lamps at present in use, although some of them undoubtedly possess a very high efficiency. A further advance towards perfection has, however, been made by Mr. Andrew Howat, of Manchester. The Howat safety lamp is an improved form of the Marsaut, or the bonneted Muesler. Mr. Howat, who has had many years' experience in the manufacture of safety lamps, has produced a lamp of this class which has successfully passed through the severest tests, but which gives a light which is stated to be three times greater than that of the ordinary Muesler or Marsaut. In the course of a series of experiments with these two lamps Mr. Howat found that a large portion of the air admitted through the inlet at the bottom of the bonnet passed directly upwards and away through the outlet apertures provided for the escape of the products of combustion at the top, instead of fulfilling its proper function and passing through the gauze cylinder downwards to the burner, as intended. This discovery led him to design his "Deflector" safety lamp, the leading feature of novelty in which consisted in the use of a flanged ring of metal fitted tightly between the outer metal shield or bonnet and the

outer gauze cylinder, and fixed upon the rods of the lamp frame at a convenient height above the air inlet. This flanged ring acts as a deflector, and by it the whole of the air admitted for combustion under or near the bottom of the bonnet is deflected downwards, passing through the gauze into the burner portion of the lamp, by which means a brilliant light is obtained. This was demonstrated upon our inspection of the lamp, and we further saw it inserted in a highly explosive gaseous mixture with perfect impunity as regards explosion, while eventually the light was extinguished by the gas itself. The lamp was subjected to a series of severe trials at the Aldwarke Main Colliery in November last, and in every case the light is reported to have been immediately extinguished when exposed to a current of explosive mixture, the greatest velocity of the current employed being 35 feet per second.

## THE COPPER SYNDICATE.

A PARIS correspondent informs us that the copper syndicate has succeeded in coming to a definite understanding with the Spanish companies. This arrangement is based on the price of £60 for Chili bars, £64 for refined ingots, and £65 to £67 for best selected. The association guarantees these as minimum prices, and divides with the producers any profit that may be realised over and above this minimum. Each producer has the right of sale as hitherto, but if he is unable to sell above the minimum, the association engages to take from him all that remains unsold. The copper companies bind themselves not to produce more than the average of the last three years, and a clause in the agreement provides for reducing the production by one-tenth, if this step should be deemed necessary by the association. Another clause affords the association the right of prolonging the agreement for three years. Thirteen companies have given in their adhesion to this engagement, representing altogether 127,000 tons on a total production of 220,000 tons, and there is now only a few producers in America and Australia whose names do not appear in the list. The association has, therefore, every interest in sustaining the prices, though they meet at present with great resistance on the part of the buyers, who are still able to procure plenty of old metal. This circumstance, and the increased production which may be expected on the part of the producers who refuse to submit to the syndicate, form the principal factors which militate against any serious and permanent advance in the price of copper.

## GATESHEAD GUARDIANS AND WHITE LEAD WORKERS.

THE Newcastle correspondent of the *Lancet* writes:—The Gateshead Guardians some time ago passed a resolution calling for the substitution of machinery for female labour in the manufacture of white lead. A reply to their remonstrance to the Local Government Board has now been received, and the letter states that the Secretary of State had been advised that, looking at the construction of white lead works, covering as they did a large space of ground, it was not possible to require machinery to be used, even if it were proved beyond contention that white lead could be produced in existing works as a commercial success by the aid of machinery. There were two methods, the letter went on to say, by which the production of white lead would be free from danger; one was the production of the article as a sulphate of lead, which was innocuous, in place of carbonate of lead; the other was the manufacture of carbonate of lead by mechanical means, by which the workpeople did not come in actual contact with the material, all the processes being carried on in covered vehicles and by machinery. Many experiments and inventions had been made in that direction, but hitherto, except in one instance, none had succeeded commercially.—In the discussion on the reading of this, one of the guardians expressed his belief that it had been proved beyond a doubt that white lead could be made of better quality and cheaper by machinery. Of course, if this statement is correct, the adaptation of machinery to this dangerous employment is only a question of time. Meantime, the danger might be mitigated by the observance of strict cleanliness and necessary precautions on the part of the employés, and the wearing of the simple but efficient respirator suggested and shown at the Newcastle Royal Exhibition by Mr. H. W. Newton.

## A NEW ELECTRIC FURNACE.

IN order to conduct experiments on different materials at high temperature, whilst, at the same time, subjecting them to great gaseous pressures, M. L. Cailletet makes use of a hollow cylinder of steel, having a capacity of about fifteen cubic inches. This cylinder is hermetically closed at both ends, but in one case the obturator is a screwed plug removable at will, through which pass two copper wires, one of which makes metallic contact with the plug whilst the other is insulated from it. Inside the cylinder the ends of these wires are connected by either a piece of platinum foil, shaped like a crucible, or else a helix of platinum wire, forming a sort of muffle, inside of which the articles to be experimented on are placed. By passing the current from a set of accumulators through the platinum, it can be raised to a white heat, which is quickly communicated to the material resting on it, so that, for example, a fragment of gold can be melted in a few seconds. In order to introduce the compressed air or other gases the wall of the cylinder is pierced with a capillary hole, which is connected by a copper pipe with a reservoir containing the compressed gases. Another orifice closed with thick glass is also pierced, to admit the interior to be inspected during the progress of the experiment. If a higher temperature is required than can be obtained by the above plan, M. Cailletet replaces the platinum foil or spiral by two carbon rods, one of which is hollowed out, forming a kind of crucible, and an arc is then established between them in the ordinary way.—*Engineering*.

## STEEL PIPES.

ACCORDING to the Chicago *Tribune*, the piping for natural gas to that city will be made as follows:—

A mild steel disc of the required size is folded under heat by several applications of specially designed machinery into the structure of the steel, and made proof against rust, even muriatic acid producing no effect upon the metal. It is then drawn cold over mandrels, which have the effect of producing the form of a tube. It is then put upon a mandrel and rolled to any desired length. It is next cleaned with acids and treated to a preparation of tin, inside and out, which permeates its thickness and increases its tensile strength 25 per cent. The result is very similar to that reached in steel wire.

An idea of the strength and temper of the metal so treated may be gained from the fact that receivers have been produced under this process whose thickness is 41-1000 of an inch and whose bursting pressure is 600 pounds to the square inch. The comparative cheapness of the process is shown by the following figures:—

A twelve inch steel piping, whose bursting pressure is 1,100 pounds, can be sold at a handsome profit for $74.67 per hundred feet, while the cost of wrought iron and cast iron piping of much less bursting pressure is $211.25 and $150 respectively. Another interesting comparison is as follows: Twenty miles of twenty-four inch seamless steel piping one-eighth of an inch thick will weigh three million pounds. The same piping, if it could be made of welded iron—as a matter of fact it cannot—would weigh 12,600,000 pounds. The same piping made of cast iron will weigh 26,755,000 pounds. In each case the bursting pressure of the steel is nearly twice that of the iron, and in addition a glass surface and a "positive" (non-leaking) piping is warranted. The piping will be made in all sizes, from thirty-six inches in diameter, and even larger if required, to the smallest used, and will probably be in lengths of twenty feet.

## PRIZES FOR CHEMICAL SUBJECTS.

THE Societe D'encouragement in Paris offers the following prizes in chemistry for 1888:—

1. Prize of 2,000 francs for the cheap production of ozone, and its application.

2. Prize of 1,000 francs for the utilisation of various factory wastes.

3. Prize of 1,000 francs for a new application of a non-metallic simple substance.

4. Prize of 1,000 francs for the invention of a new metallic compound, especially applicable for works of art.

5. Prize of 3,000 francs for the manufacture of iron or steel of peculiar properties, produced by the addition of a foreign body.

6. Prize of 1,000 francs for a new industrial application of any mineral substance (such as chalk, lime, silica, alumina, sea salt, iron minerals, etc.), which can be abundantly and cheaply obtained.

7. Prize of 4,000 francs for profitably utilising a metal, which has hitherto had but little use in the arts.

8. Prize of 2,000 francs for the industrial production of chlorine from the waste products of the ammonia-soda process.

9. Prize of 3,000 francs for the manufacture of glass vessels for chemical operations.

10. Prize of 3,000 francs for stoneware.

11. Prize of 3,000 francs for the utilisation of atmospheric nitrogen as nitric acid, ammonia or cyanogen.

12. Prize of 3,000 francs for the artificial production of graphite for lead pencils.

13. Prize of 3,000 francs for the preparation of artificial, black, or hard diamonds.

14. Prize of 3,000 francs for a practical study of the physical and mechanical properties of one or more metals or compounds, which are most generally used.

15. Prize of 3,000 francs for a scientific investigation of an industrial process which is, theoretically, imperfectly known.

16. Prize of 4,000 francs for a literary production, of value to the chemical or metallurgical industry.

17. Prize of 2,000 francs for a manufacturer who will furnish sulphuric acid, entirely free from arsenic, using pyrites as the raw material.

## HOW THE WORLD WAGS.

IN the French Chamber of Deputies last week, M. Laur, Radical, put a question to the Minister of Justice regarding the monopoly of copper lately secured by a French syndicate, and demanded the adoption of legal measures against such a coalition. M. Falliéres, in reply, admitted that the rise in the price of copper had considerably affected the industrial and financial world. He did not, however, think that the circumstances referred to came within the law. If any monopoly was established the matter could be referred to the courts of law.

In connection with the foregoing paragraph, it is unfortunate that the eye of the law cannot be turned on the London clique who have been so successful in rigging the tin market. The suddenly enhanced prices of both copper and tin has become a serious matter to the whole manufacturing community, and the chemical trade and its allied industries share in the general misfortune, which is enriching a few already rich men who have acted *in forma parentis* to the tin market for some years. Why do not they help us to raise the price of silver? and thus settle the currency question.

## THE FLINT AND LIME GLASS ASSOCIATION OF AMERICA.

THE syndicate has now been regularly organised, and now, under the name of the American Flint and Lime Glass Association, may be found one of the greatest monopolies of the age. But its objects have been extended, and in the future the price of the smallest piece of glassware will be fixed by the association, which controls forty-three furnaces with a daily output of 1,000 tons of glassware, the greater number of which are in the Pittsburg district. The association limits production, fixes prices, and the penalties attached to the violation of rules. The intention avowed in the formation of this pool was simply the desire of the manufacturers to make more money. The smaller and weaker houses had been able to keep down prices by securing advances from jobbing houses for their output. Some of the smaller houses objected to going into this combination, on the ground that they would not be able to keep up, and it was only on the pledge of the new association to take care of them that they at last signed. The high tariff duties make the monopolies of this kind possible, and stifle home as well as prevent foreign competition. The *ad valorem* rates on unpolished window glass ranged last year from 60 to 108 per cent, the last named rate being collected on 17,608,435lb. On glassware the rate was 45 per cent. On plate-glass, such as is used, for shop windows, the rate rose even to 153 per cent.

## ADULTERATION OF FOOD.

THE Public Analyst for the City of London (Dr. Sedgwick Saunders) has just prepared his report for 1887. In reply to a reference to report generally on the operations of the Food and Drugs Act, 1875, and the Amendment Act, 1879, he says from the earliest times attempts were made to prevent the sale of unwholesome or adulterated food. Public analysts were appointed in 1860, but, in consequence of the initial proceedings being left to private purchasers and the Act being a permissive one only, it remained a dead letter. This defect was remedied by the Acts of 1875 and 1879. The total number of public analysts approved by the Local Government Board up to the present time is 267, 39 of these being in the metropolis. In 1881 the number of samples examined in England and Wales was 17,823, and in the City of London 162, giving a percentage of 0·92; in 1886 the total number of samples examined in England and Wales was 23,596, and in the City of London 188, showing a percentage of 0·79. In 1887 the number of samples examined in the City was 294, the return for England and Wales being not yet received. The 294 analyses included 59 arrowroot, 18 of beer, 4 of bread, 15 of butter and butterine, 20 of coffee, 13 of disinfectants, 37 of drugs, two of extract of meat, 18 of gin, 57 of milk, 22 of mustard, 3 of pickles, 8 of pepper, 2 of rice, 14 of rum, 4 of tea, 18 of water, and 34 of whisky. Three milkmen were prosecuted and fined, but most of the samples were found to be genuine and unadulterated. Periodical examinations of the New River water supply to the City have been made with the usual satisfactory results. All the nine samples of well water from the City of London Cemetery at Ilford were more or less contaminated by human remains. The Local Government Board stated that Londoners were paying between £60,000 and £70,000 a year for water sold under the name of milk, but the leniency of justices made it difficult to deal with adulteration. In one district alone the analyst reported that the milkmen received between £7,000 and £8,000 a year for water, while the fines inflicted collectively only amounted to £100 during that period. Although for some years past about 23 per cent. of the total number of samples of spirits examined under the Act in England and Wales have been found adulterated with water, this form of tampering did not obtain to an appreciable extent in the City of London. Respecting coffee, there was little doubt that the article when ground was largely mixed with chicory (he had found 40, 50, and even 60 per cent.), but it seemed to be a recognised custom in the trade of a retail grocer, especially in the poorer districts, to sell such a mixture when coffee was asked for, and as a rule the purchaser was well aware of the fact. The examination of tea in bond by the analyst to the Commissioners of Customs was so thorough that out of 511 samples examined by public analysts only one was reported to be adulterated. Dr. Saunders states that he examined four samples of tea which, in spite of being submerged in the Thames and redried, yielded a fair amount of extractive matter, and the ash was normal but dirty. It had been passed by the Customs authorities, and was subsequently sold by public auction at five farthings a pound and exported immediately.

## STANDARDISING HYDROMETERS.

BY PROF. W. P. MASON.

SOME time since I prepared standard instruments, arranged for liquids lighter than water, for one of our large corporations. The hydrometers were constructed by Chas. J. Tagliabue; the stems left unmarked and the tops open.

Each instrument (there were four in a set) had a capacity of but 20° Baumé; the four thus covering the scale from 10° to 90° B.

Upon each stem I determined three points, upper, middle, and lower, and fixed thereon the permanent paper markings. In obtaining these points I employed Clark's method, weighting the instrumont internally and using water at 60° F. as the floating liquid. The papers having been placed and fastened, the added weights were removed, and the stems were then closed before the blowpipe.

As a check, the closed hydrometers were next floated in prepared liquid (oils generally) at 60° F., of specific gravities *exactly* equal to the indications on the paper markings, and the points where the liquids cut the stems noted by slight file scratches.

What is particularly worthy of attention is the lack of uniformity in the readings determined by the two methods.

Greater care could not have been exercised than was given during the entire work, and I am forced to ascribe the variations in reading (not far from $\frac{1}{10}$ of a degree) to differences of surface attraction in the several liquids. Such differences would naturally result in the mounting of liquids to unequal heights up the stem of the hydrometer; and, moreover, even granting that the volume of liquid mounting the stem were constant, yet the varying specific gravity thereof would always enter as a disturbing factor of the total weight of the instrument.

From my work in this matter I am convinced that hydrometers should be standardised by floating in water alone, according to Clark's method; and I would further add that I believe a degree of delicacy is often demanded of them beyond what their capabilities can bear.—*Journal of the American Chemical Society.*

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

EXPERT EVIDENCE.—*continued.*

Professor James Dewar recalled. Cross-examined by Mr. Aston.

I will ask you whether it is not true that any person reading Spence's specification so far as relates to the directions given by him as to the *modus operandi* would succed in obtaining the result? Take it from the words, "In carrying out our said invention," down to "well known," at line 38?—I am afraid that question is so general that unless I were to explain the difficulty——

Then I will break up the question. Suppose any person were to take a solution of sulphate of alumina prepared by digesting bauxite with sulphuric acid, and were to add to it a solution of peroxide of manganese prepared in the manner described by the patentee, would he not remove the iron from the solution?—My difficulty is with reference to what is to be understood by the mode of preparation defined by the patentee.

Then take this: Suppose he prepares the peroxide of manganese "artificially in a form similar to the production of Weldon mud in the chloride of lime manufacture, and it should be fully oxidised by modes well known"?—That is the real crux of the difficulty. What is to be understood by the reference there to the words, "artificially in a mode similar to the production of Weldon mud in the chlorine manufacture," and that "it should be fully oxidised by modes well known."

Mr. Justice Kekewich: Where does that the crux come? What interpretation the chemist is to put on the statement "such peroxide of manganese we form artificially in a mode similar to that production of Weldon mud in the chloride of lime manufacture, and it should be fully oxidised by modes well known."

You mean in both those cases?—Yes, I mean in both cases. No Weldon mud has ever been made which in the strict chemical sense is fully oxidised; therefore you have two interpretations there. The proper interpretation would mean, you are not to use Weldon mud that has not been efficiently treated by the Weldon process, or else you can use a new material which has never been formerly employed in the arts which you call "fully oxidised Weldon mud" chemically. Consequently, my difficulty there is this: If you mean the most efficiently oxidised Weldon mud which can be produced in the Weldon manufacture, then I say undoubtedly it will separate iron, and manganese will pass into solution.

Mr. Aston: I am not asking the question invidiously; you know I could not possibly do so; but are you practically acquainted with the manufacture of Weldon mud from having been called in especially to see the operation?—I am only acquainted with Weldon mud from the fact of being an intimate acquaintance of Mr. Weldon, and from the fact of my having visited many works, and being until a very recent date in very intimate relations with Mr. Weldon.

That does not answer the question?—I have not conducted the manufacture of Weldon mud outside the laboratory.

You have heard the evidence that has been given to the effect that if you go into the market and buy Weldon mud, and apply it to this process, you will separate the iron?—I say you could not buy Weldon mud, but I say——

I beg your pardon—assume that you could buy Weldon mud?—I never said so, because I never heard of Weldon mud being on any chemical or trade circular or otherwise.

Will you take it from me that you can go and buy Weldon mud exactly in the same way as you can go and buy a pound of sugar?—I will take it from you, but I cannot admit it. I will take it as an exception.

You saw the parcel sent by Dalgleish's.

Mr. Justice Kekewich: Mr. Dewar says he will accept your statement.

The Witness: I accept your statement.

Mr. Aston: Then assuming that to be so, that Weldon mud is employed and does answer the purpose, is it not the fact that in that case the agent which operates to remove the iron, the active agent is the peroxide of manganese existing as it does exist in Weldon mud?—Yes, it is the effect of the manganite of calcium and the manganite of manganese. I suppose you will accept, will you not, a treatise on Chemistry, by Roscoe and Schorlammer?—Yes, I know it well enough.

Suppose I read you this from page 15: "A much more perfect and less troublesome process was invented by Mr. Walter Weldon in 1867, and first practically carried out in chemical works at St. Helens in 1868." You know that?—Yes, I have seen it there.

"This process, which is now universally adopted both by British and Continental manufacturers, depends upon the fact that manganous hydro-oxide is completely transformed into dioxide by air heated to 55°, when an excess of lime is present." Do you adopt that?—With certain reservations.

That is a popular description?—That is a popular description of the Weldon process.

Mr. Moulton: I think you ought to go a little bit further, to where he says, "And the clear solution of calcium chloride drawn off from the deposit of black dioxide combined with lime, technically termed "manganese mud."

The Witness: I can admit the fact that the peroxide of manganese is combined with lime and protoxide in that.

Mr. Aston: And you will not withdraw from the statement that in that compound, whatever it is, peroxide of manganese is the active agent for recovering the iron?—That I cannot go the length of, because the action here is a combined action. It is really the manganite of calcium, or the manganite of manganese, though all act equally well. Any salt will act.

And the salt is a salt in which you have peroxide of manganese present?—Clearly.

Have you taken Weldon mud and separated from it all the elements except the manganese there present?—I have.

Under those circumstances have you tried the separated products, apart from the manganese, to act upon the iron?—Yes.

Is it not the fact that they are inactive?—It depends altogether upon what you mean the treatment of Weldon mud to be subject to. If you mean removing the lime, the only efficient mode of removing the lime is by treatment with dilute acid.

You have not answered my question. I am sure you will deal fairly with me?—Yes.

Weldon mud contains manganese in some form—oxide of manganese I may say—in some form, plus other matters?—Yes.

You tell me you have separated the manganese, and got as a residue the other matters?—Yes.

Have you tried those other matters which you got when you separated it?—What you do separate—as I tried Weldon mud with nitric acid—is nothing but nitrate of lime. Nothing but peroxide of manganese is left. The nitrate of lime is absolutely inefficient.

Therefore the residuum left in the Weldon mud if you remove the oxide of manganese is inefficient?—Yes, the lime is inefficient.

Now, with regard to the Weldon process, I will read you from Lunge's book. Do you know that book?—Yes, very well.

At page 221 Lunge says: "While by using the full equivalent of excess of lime in the Weldon process, the whole of the Mn $(O H)_2$—or the whole of it within 1 or 2 per cent.—can be converted into $Mn O_2$. The full equivalent of exces$_s$

of lime is never now used in practice."—That is perfectly true.

You agree with that?—I do not agree that in practice the oxidisation was ever carried so far as he says, but I agree in practice that the Weldon mud would never have been a success if it had been attempted to carry it out with that excess of lime.

That is not what I am upon. Of course you qualify your answers in the way you think right.

Mr. Justice Kekewich: No, Mr. Aston; you read to the witness a long sentence which contains more than one proposition, and you ask him whether he agrees.

Mr. Aston: And he says he does.

Mr. Justice Kekewich: Yes, but the witness following you agrees with part of the proposition, but does not agree with the other part, and is obliged to distinguish. Then you must not quarrel with him because he cannot say he agrees with the whole. It does not assist one to read those long sentences and get that sort of qualified opinion.

Mr. Aston: I do not think it does, my Lord.

Now you know, do you not, professor, that it was well known that in the manufacture of Weldon mud, when you had excess of lime present, the currents of air oxidised the lower oxides and made them peroxides?—I do not understand exactly what you mean, but I think I can explain to to his Lordship in a minute what was the condition of the Weldon manufacture, and what is the present condition of it. Mr. Weldon originally found that an excess of lime was essential for rapid oxidisation; then he found that that was impracticable, because the mud in the formation of it became thick and crystalline. The result was that the amount of lime was largely diminished, and the present Weldon process is carried on by a much smaller amount of lime than he originally intended. That is the real fact.

Mr. Justice Kekewich: And with equal success?—With much greater success because it was impracticable. As a matter of fact, the original process gives a much larger percentage of combined peroxide, but it is impracticable from the thickening of the mass and from the excess of lime using more acid than chlorine manufacturers would employ, so that the loss on the one side is not balanced by the equivalent gain on the other.

Mr. Aston: At all events you knew that by adding the chloride of lime to the bleaching powder, you would increase the oxidisation of the lower oxides if any protoxides were formed?—I knew that as a laboratory operation that was the usual test for manganese, and that if any chemist in the laboratory had been asked to oxidise Weldon mud it would have occurred to him to use chloride of lime, but that was certainly never employed on the manufacturer's scale, never at all.

Assuming that you followed those directions in the sense in which I have put them to you, namely, taking Weldon mud containing as you tell me peroxide, and as far as possible completely oxidising it by the well known methods you have spoken of, is it not true that then you have a sufficient agent for removing sulphate of iron from the aluminous solutions?—Yes. I say the most fully oxidised Weldon mud which you can obtain would remove something like 88 per cent. of 100 per cent. possible. It is different when manganese passes into solution, from the fact of its containing incompletely oxidised manganese.

Then the more completely you oxidise the manganese, as you are directed to do here, the more efficient that agent is here?—Yes. You cannot exceed by the Weldon mud process referred to 80 per cent.

Therefore you agree with the witnesses for Messrs. Spence, the defendants, that the more complete is the conversion of the oxide of manganese into the peroxide form, the more efficient is the agent for the purpose of the patentee?—Yes, if you confine it strictly to the hydrated peroxide of manganese and eliminate any question just now of the difference produced by the manganites.

I am doing that. Now under those circumstances we will suppose that I am right in saying that those are the plain directions, and that is the plain meaning of the directions given in this specification. If that is so, I suppose the directions so interpreted would enable the iron to be recovered as directed and proposed by the patentee?—Yes, I say that if I am to read this fully oxidised by modes well known into a laboratory operation which had never been employed on Weldon mud, the product does efficiently remove iron. I say that the interpretation of this passage means one of two things: either a direction to use the best Weldon mud which had been fully oxidised as far as the Weldon process went, or to oxidise it in some laboratory where it had not been employed at all up to that time in treating Weldon mud.

Do you disagree then with the statement made by Mr. Pattinson and others that it was perfectly well known in 1882, that the material that would naturally be employed in fully oxidising the Weldon mud would be the bleaching powder?—I say that the bleaching powder would be one of the agents a chemist would employ, but he might employ others.

Do not you know that bleaching powder is an agent that is employed and was employed to effect the complete oxidisation?—I have said that bleaching powder is the common ordinary test of manganese. Add bleaching powder to your solution of manganese and you get the precipitate. That has been well known for the last hundred years.

Mr. Justice Kekewich: Mr. Aston, are you going on to the rest of the specification?

Mr. Aston: Yes, my Lord.

Mr. Justice Kekewich: Then I should like to call Professor Dewar's attention to some of the words there which I have not quite mastered. At the end of line 14 you will see two words, "in the"?—Yes.

Then look on to the last word of line 16—"solution." It seems to me obscure, because I have not listened to any argument on the construction. That "in the," down to "solution," must be in parenthesis. Then it would read thus: "We add to the above-named solution peroxide of manganese; such peroxide of manganese we form artificially," or to change the grammatical form—"which peroxide of manganese we form artificially." If that is the proper construction of the sentence the patentee does not point to the employment of Weldon mud as a marketable commodity, but the employment of an article which he is to form, and which may be called Weldon mud. Is that possible?—That is my interpretation of the construction.

Was that possible in 1882, or would that be a thing which a competent chemist could do in 1882?—I think, if the problem had been put to a chemist, he would at once have described how to do it.

Weldon mud was well known at that time?—Yes, it was well known, but not in the sense of a "fully oxidised"——

Now, I go on to "fully oxidised." Could he have done that without difficulty, having this before him. Would he have known how to set about and produce this artificial thing?—Undoubtedly.

Then, having got that, would he have known how to go on and fully oxidise it?—If he had been asked to get all the manganese in the form of peroxide, he would have required to subsidise the Weldon process by new treatment.

Not by treatment well known?—Not by treatment well known, unless you refer to a laboratory operation of oxidation. As a matter of the Weldon process itself it would stop, and you must add then something more.

That is my construction. We will assume now for the purpose of the second part of the sentence that he has produced that which will be called Weldon mud. It need not be Weldon mud, but it is something of the same character? Yes.

Very much the same character?—Yes.

But it is not Weldon mud purchased in the market in the ordinary way?—No.

Could he have got by modes well known and fully oxidised the article so produced?—Yes. I say that he said he employed well-known oxidising agents in the laboratory to transform the whole of the manganese into the form of peroxide.

Mr. Aston: As a matter of fact, you performed experiments beyond those directions which are here given in order expressly to produce an anhydrous form of peroxide?—Amongst many other experiments I did.

Kindly answer me as directly as you can. Those experiments were more or less experiments that involved time and trouble in order to produce the peroxide expressly in the form of an anhydrous peroxide?—I do not exactly see the point of your question. I did produce peroxide anhydrous along, as I said, with many other specimens of peroxide, but I spent no more trouble on the production of the peroxide than on the production of the others.

I do not say you did, but your whole object in those experiments was to ascertain what would be the effect of the anhydrous form of peroxide?—Yes, I examined it along with others.

And it is true, is it not, that in every one of those cases when you tried the anhydrous form of peroxide you did more

or less—less we will say, or more—remove iron from the solution?—I think that a small portion of the iron is removed when you add a large portion of any form of peroxide.

Would you kindly answer my question if you can?—I am trying to do so.

My question is—Is it true or is it not?—I say it is true that you can remove a small portion of the iron by adding a large portion of anhydrous peroxide.

You have favoured us with information upon that point before which I accept, as I always accept information from you. Tell me whether this is not the outcome of your experiments; I will first read what it is that you say in your affidavit of the 15th July, 1886. In paragraph 4 of that affidavit what you say is this: "In Spence's specification the term Weldon mud merely occurs analogically as descriptive of a mode of making what must by 'modes well known' be fully oxidised peroxide before it is applicable to Spence's process."

Mr. Justice Kekewich: That is a statement which found its way into the affidavit, but it might just as well not have been there. You can ask him a question upon it. If he says it is true it cannot make any impression upon my mind any more than it can if he says it is false.

Mr. Aston: I am sure he will say it is true.

It is true, is it not?—Anything that I had made a statement of there is true.

Do not put it in that general way, please. I will read the paragraph again. "In Spence's specification the term Weldon mud merely occurs analogically as descriptive of a mode of making what must by 'modes well known' be fully oxidised peroxide before it is applicable to Spence's process?" That would be my impression the time of reading the specification.

You say: "My experience of use of manganites, as described by Kynaston, has led me to the conclusion that their application" (that is the manganites) "is in some respects more advantageous than that of the pure peroxide in effecting the purification of the salts of alumina from iron. You are of that opinion still?—I am.

When you used the pure peroxide did you mean in that case the peroxide that was wholly free from water?—I used a peroxide——

Did you—Yes or No?—I meant the peroxide as free from water as it could be obtained chemically. I was speaking of anhydrous peroxide.

Is it not true that, chemically speaking, anhydrous peroxide is not formed within your experience absolutely anhydrous?—I think the amount of water——

Is it true?—You must allow me to explain if you put me a recondite question like that. I say the amount of water which exists in anhydrous peroxide is certainly not proved to be chemically combined; but it is really water which is probably absorbed out of the atmosphere during the operations of weighing or collecting.

But, at all events, as far as you know, in all forms of so-called anhydrous peroxide, there does exist a minute proportion of water?—There is probably a minute proportion of water, but it is certainly due to secondary results.

To whatever it is due, the expression anhydrous peroxide is chemically an expression that no physical conditions that you know of, as regards the peroxide, could be said in truth to satisfy?—I think you may apply that to any chemical substance whatever.

But to this particular substance?—To that amongst the others.

Is it not true that as the outcome of your experiments you found that according as the peroxide is more or less hydrated so it is more or less efficient for the purposes of Messrs. Spence?—That is true when I compare the hydrated amongst others.

Now, I have almost finished the questions which I have to put to you. You tried, did you not, a form of peroxide of manganese, which you found in the native ore?—I did.

And am I not right in saying that you endeavoured to pulverise the native ore, and reduce it as far as you could to the condition of a finely powered anhydrous peroxide?—I did use it in a finely powered state.

Did you make any effort to make it anhydrous?—No, because it was anhydrous already. I know that.

It was anhydrous in the sense in which you use it?—Yes.

Mr. Justice Kekewich: He does not mean it in any other sense.

The Witness: It did not contain combined water; it contained some water, no doubt.

Mr. Aston: Now, suppose that you had taken that ore and dissolved it with hydrochloric acid as you would do in making the residuum of the bleaching liquor—you know what that process would be?—Yes, you mean to dissolve it in hydrochloric acid and transform it into Weldon mud.

I mean the residuum liquor?—Well, the residuum liquor of the chlorine. Of course you mean chloride of manganese containing hydrochloric acid.

Yes?—I beg your pardon.

In that case the treatment of the native ore would be analogous, as far as it goes, to the treatment which is spoken of by Messrs. Spence in which they say, "We proceed in a manner analogous to the proceedings followed in the manufacture of Weldon mud." Would it not?—If you dissolve it, you can transform any form of peroxide into Weldon mud.

Then, under those circumstances, is it not true that the result of the treatment of the native ore would be that you would have hydrated peroxide, and that if you fully oxidised that by applying the knowledge possessed by chemists you then would have an efficient agent for the removal of iron?—Yes, undoubtedly, if you transform the anhydrous peroxide into the hydrated peroxide, the most convenient process is Weldon mud.

That method of dealing with Weldon mud you have not tried and you need not try, because you know what the result would be?—I admit that all forms of properly prepared Weldon mud are efficient.

Kindly answer my question. You did not try and you need not try, because you knew what the result would be of that method of dealing with the native peroxide. Is not that true?—I tried the native peroxide as I found it.

Would you mind answering my question. You did not try it in the way I have suggested?—No; I did not try the specimen that I used in my experiment. I did not transform any of that into Weldon mud, because I knew if I did it would work perfectly well. I do not deny that.

Therefore you knew of a method of dealing with the native peroxide which would make it, when so dealt with, efficient?—Yes, if I had gone on that roundabout process—but as I had peroxide there, I only purified it in that way.

Mr. Justice Kekewich: I understand you to mean native or any other peroxide?—Yes; or any other.

Mr. Aston: Native or any other peroxide might have been treated in this way?—And transformed into Weldon mud.

"With reference to the use of manganese combined with oxygen as a peroxide, whether produced from the lower oxides by oxidisation or from manganic acid or permanganic or their salts by deoxidisation"—both those would refer to the methods of producing peroxide artificially, would they not?—Undoubtedly.

I am afraid I am putting a question now which will weary my Lord, for it wearies me: Is it not true that if you have an acid which is not capable of separation, but which is known to exist in combination with other matters, chemists often operate upon that acid in its compound form, and obtain forms of it combined with other matters as they want it?—They cannot obtain forms of it, because it cannot be obtained in a free state. They may operate with the salts of a body which has not been separated, such as manganates or permanganates. We operate with them although we cannot operate with the acids.

In a very celebrated case that you wot of, I think you said that it would be a bold chemist who could at this time foretell the results that might be obtained by further researches in chemistry?—I think you refer to my statement when examined in the *Badische* case that there is no such thing as prevision in chemistry.

And you say not?—Certainly I would, within limits, of course.

Would you pledge yourself that it would be impossible to produce manganic acid in an isolated condition?—I would not.

If it were produced in a free form there would be no difficulty in obtaining a peroxide from it?—So far as I can judge of what the properties of the substance might be, I should say No, but I could not go any further.

Mr. Justice Kekewich: At present you have no wish to anticipate its power in any particular form?—No, that I cannot divine.

Mr. Aston: Its constitution is given, is it not, in the ordinary text books?—We know its compounds very well.

Mr. Justice Kekewich: That is the constitution of an unformed child.

Mr. Aston: The constitution of manganic acid is $H_3 Mn O_4$?—That is the hypothetical acids.

I understand that you would not object in papers that you might read, and that you did not object in a paper which you were good enough to read last week, to speak of the Weldon mud process as the process of regenerating the peroxide of manganese?—It is quite possible that I used the expression.

And you would use that again?—Certainly, because it depends altogether upon whether you are addressing students, or whether you are addressing the manufacturing community. I was dealing there with the Weldon process and with the new Weldon process.

Supposing this was a paper addressed to the Chemical Society, as I understand it was——?—The Chemical Industry Society.

Peroxide of manganese then would be understood to be hydrated peroxide would it not?—I cannot say so, because I think, if addressed to the mind of a chemist he would know, if he thought of Weldon mud, what Weldon mud was, but nothing more.

Peroxide of manganese used in connection with Weldon mud and understood in the sense in which you employed it by chemists, would convey a meaning to their minds that could not be mistaken?—It would convey the meaning that I was referring to Weldon mud.

Mr. Justice Kekewich: Supposing you were addressing a chemist with a view to explaining to him some experiments, the nature of which until then you had given no indication of at all, and you said "I am going now to explain to you an experiment," so that his mind would not be attuned to anything; and supposing you said, "Take for instance some peroxide of manganese." What should you expect him to understand by that?—He would understand, of course, the anhydrous peroxide of manganese, undoubtedly.

Mr. Aston: But if it were addressed to persons who had been talking about Weldon mud. I understand you to say that they would understand hydrated?—Yes; if one were discussing to the chlorine manufacturers undoubtedly, if he used the term "peroxide," he would mean Weldon mud.

Yesterday, in answer to this question—"Will you give his Lordship some of the ways in which you prepared peroxide; which give the result containing these intermediate oxides or manganites of manganese?" the answer was: "The simplest body to obtain in that form is Tennant's oxide of manganese, obtained by oxidisation of the carbonate at a high temperature." Is not that a marketable compound—Tennant's oxide of manganese?—So far as I remember, about twenty years ago, we did get it in Scotland for the purpose of making chlorine, but I am not aware whether it appeared in ordinary price lists—not for many years.

Was not that sold as peroxide of manganese?—I believe probably to a slight amount—to a very small amount.

Now one word about Kynaston's specification. You know that?—Yes, I do.

Kynaston's process is practically using Weldon mud to remove iron from sulphate of alumina solutions, is it not?—Am I to give my opinion on the claim, or am I to give my opinion on the specification.

Shortly?—Shortly, I take it that the inference is that he claims the use of any manganite, combined, of course, with and including manganite of hydrogen.

Kindly attend to my question. Is it not true that anybody following the directions given in Kynaston's specification would employ peroxide of manganese in the form in which it is found in Weldon mud for removing iron from sulphate of alumina?—Certainly not, because he gives the alternative process.

But one of the processes would be that?—Yes, if you used manganite of manganese and calcium, then of course Weldon mud would come under Spence's claim. If you chose to use pure manganite of calcium then it would not be Weldon mud.

Is there any direction in Kynaston's specification that you are to start with anything else except Weldon mud or its analogue?—Yes, he distinctly points out——

That you are to start with what?—He points out that he claims first of all precipitated peroxide of manganese.

Mr. Justice Kekewich: Where are you now?

The Witness: At line 21, "In my new process, now to be described, the agent used is the hydrate of peroxide of manganese."

Mr. Aston: Stop there,

Mr. Justice Kekewich: You mean to refer to Kynaston's specification, do you?

Mr. Aston: Either, my Lord, as far as this matter goes.

Mr. Justice Kekewich: I want to know which you are referring to. You cannot refer to either. I must have one or other before me.

The Witness: I refer to line 21, at the beginning of the specification, where he describes hydrate of peroxide of manganese.

Mr. Aston: It is Kynaston's specification. He says, "Hydrate of peroxide of manganese," and he says at the end of the sentence, "and this is the form I prefer. I use the recovered manganese known as Weldon mud, and so extensively used in the manufacture of chlorine." Now if he uses the recovered manganese known as Weldon mud, does he not use the peroxide of manganese in the form in which it is only found in Weldon mud?—Of course he must. If he says Weldon mud he must use it in the form in which it is only found there. I have said that it would be a mixture of manganite of calcium and manganite of manganese.

Whatever it is, the form that he uses there is a hydrate of peroxide of manganese?—Combined hydrate of peroxide of manganese with lime and the protoxide of manganese.

But the agent which he employs for the purpose of removing the iron is the hydrate of peroxide of manganese?—No, I never said so.

I will read it to you. Take page 2, line 21: "In my new process, now to be described, the agent used is the hydrate of peroxide of manganese." Stopping there, is it not true that the agent which he there refers to means the agent which he employs for removing iron from sulphate of alumina solution?—Undoubtedly; but he uses it in two forms, either as free hydrate, or as a salt of the hydrate. Therefore he uses it in two ways, either as manganous acid of hydrated peroxide and manganite of hydrogen, or with manganite, namely, that body combined with other oxides.

Therefore, in the two forms which he uses, in the first to which he refers, he uses it as the hydrate of peroxide such as is found in Weldon mud?—No, no. He describes two modes of precipitating it from solutions of manganese by any of the well known means, and he says, "Then by the addition of bleaching powder or other hypochlorite," that is any soluble hypochlorite or solution of permanganate. So he gives two processes of precipitating the hydrate of peroxide of manganese from salts of manganese. Then he refers finally to Weldon mud which is a totally different thing.

Then there are two processes which are there referred to. Now is it not true that in that same paragraph he refers to the addition of a solution of bleaching powder or other hypochlorite as well known means?—Yes.

And that is the agent which you say every person knows is a laboratory experiment?—Yes.

He refers to it as being well known to the readers of his specification?—Certainly.

You have no doubt that it is so?—No doubt at all, To the chemist it is clear what he meant when he spoke of the hydrate of manganese precipitated.

You say that there are two modes of producing his peroxide of manganese?—No, he uses it either as a hydrate of the peroxide of manganese, or he uses the hydrate in combination; and you see it distinctly referred to in the claim.

I quite agree, but is it not true that, in both those cases, the efficient agent is that form of the oxide of manganese which exists in the form of a peroxide?—Undoubtedly it is because, in the one case, it is combined, and in the other it is only combined with water—combined with basis on the one hand, and water on the other.

Mr. Justice Kekewich: You observe that in line 21, Kynaston speaks of the hydrate of peroxide of manganese as being more correctly described as the manganite of hydrogen?—Yes.

Do you agree with that?—Yes, I do, in strict chemical language.

He says "more correctly speaking." You understood him to be speaking in strict chemical language?—Yes.

And so understood you agree with him?—Yes, I quite agree with him because it enables him then at once to classify the claim for manganites.

RE-EXAMINED BY MR. MOULTON.

Kindly look at the paragraph to which you have been referred, beginning at line 21 and going down to line 27 in Kynaston's specification, down to the words "or of a solution of a permanganate." There is no mention of Weldon mud, is there?—None.

Can those substances be used with solutions of manganese, as for instance chloride of manganese?—Any soluble salts.

Then I will go on, "Or, and this is the form I prefer, I use the recovered manganese known as Weldon mud, and so

extensively used in the manufacture of chlorine." Will that act if you use Weldon mud?—It does.

Now just let me ask this question as to regenerating the peroxide, and the use of the word peroxide with regard to the chlorine manufacture. In making chlorine, hydrochloric acid is put on a body containing peroxide of manganese, is it not?—That is true.

Does it make any difference to the chlorine manufacturer whether the peroxide is in combination, or is not in combination with other bodies?—I should require to qualify my answer in this sense. The chlorine manufacturer wants to have as small an amount of lime or bases present as possible, and as large an amount of oxygen as possible, but he does not care what is the oxide with which the manganese is combined.

I will put it in this sense: So far as being able to get chlorine from it, can he get it from the peroxide uncombined, or from the peroxide combined with lime or manganese?—He can all the same.

Therefore, for his purpose, is it equally regenerative whether it is a salt or the anhydrous body?—It is quite the same.

You have been asked as to whether the anhydrous peroxide contains water. Excepting that it is liable to impurities, like every chemical body, is anhydrous peroxide impossible to make?—It is no more impossible to make than any other chemical body, absolutely pure.

Does it contain any water in combination in the form in which you have been using it?—It is simply this: If you make two samples at different times you may find one with ·1 per cent. of water and one with ·2 per cent.; you try a different mode and it may be that in one case you have ·15, but it is never in definite proportions.

Will an anhydrous peroxide become hydrated if you put water on it?—No, certainly not.

Now I want to call your attention to the claim in Spence's patent. Take a case of getting hydrated peroxide of manganese from a permanganate salt. How would you do it. Just take the ordinary permanganate of potash?—By deoxidation.

But what would you do to it?—First of all you may add any salt of manganese—any soluble salt of manganese—and according to whether you add a permanganate to the manganese, keeping the other salt of manganese in excess, or the other permanganate to the manganese, you get a purer form of manganese.

You heard, for instance, the exception which Mr. Esilman said he made with permanganate when he first tried this invention. Do you remember his description of it?—I do not remember it at the moment.

Mr. Aston: How does that arise on the cross-examination?

Mr. Moulton: I will show you directly how it arises.

Mr. Aston: Perhaps your Lordship will allow me to ask the professor not to answer until we see what the question is?

Mr. Justice Kekewich: Certainly, if you object.

Mr. Moulton: Mr. Esilman says, "I tried varying quantities of $Mn\ O_2$, made by oxidising $Mn\ Cl_2$ by $K_2\ O\ Mn_2\ O_7$, and washing; then mixing with 8 ounces of 60° Twaddle (cold) liquor, and keeping near 210° F. for one hour, and then filtering off and then testing for iron?—That is intended for chloride of manganese acting upon permanganate of potash. That is what I described to his Lordship.

*(To be continued.)*

## THE SOCIETY OF CHEMICAL INDUSTRY.

### MANCHESTER SECTION.

ON Tuesday last, the 6th inst., a paper was read by Mr. Rowland Williams "On methods for the estimation of free sulphuric acid in alum cake and sulphate of alumina." Mr. Williams said his experience was that the process in which strong alcohol was used gave the most accurate results. Some chemists had objected to this process on the ground that other ingredients besides free sulphuric acid were dissolved by the alcohol, but numerous experiments he had made had shown that this objection was without foundation.

### GLASGOW SECTION.

AT the Fifth Sessional Meeting of the Glasgow and Scottish Section, held in Glasgow on the evening of Tuesday, the 6th inst., the chief feature was the reading of a paper by Mr. F. J. Rowan, C.E., on "The Estimation of the Calorific Value of Solid and Liquid Fuel."

After clearing the way by detailing at some length past and present theoretical formulæ for determining the calorific potentialities, first of coal and other forms of solid fuel, and secondly of fuel in the liquid and gaseous states, the specialist frankly invited the meeting to agree with him that these formulæ, in the only results hitherto accruing, were in a very marked degree unsatisfactory, and quite unreliable for purposes of practical deduction. While by no means setting aside theoretical testing as out of the running altogether, he turned with rather more of hope to the possibilities inherent in a systematic observance of fuel in actual service, but even here, after no little of patient scrutiny, there was as yet nothing of certainty to be discovered on which to build up any solid superstructure of data. Knowledge even of the elementary constituents of coal itself was marvellously deficient. The question as between the possibilities of solid and liquid (or gaseous) fuel, considered on the potential and economic ground, was in point of fact in the purely experimental stage, with, it is true, a strong presumptive leaning in favour of the latter, the customary comparative estimate of which had in all likelihood been hitherto pitched at much too low a figure. The very latest developments, as regards theoretical calorimeters, certainly claimed added merit; but all the same, the conclusion was meanwhile inevitable that a fairly satisfactory table of testing dicta still lingered as an achievement of the future, offering a seductive field of emulation for all interested in the problem.

A very interesting conversational exchange of opinion followed, in which the chairman, Mr. J. J. Coleman, Professor Dittmar, and one or two others joined. A gentleman on the staff of the Clippens Mineral Oil Company tendered an announcement very much to the point, to the effect that at the Clippens works steam raising was to be seen in operation by coal fuel and oil refuse fuel alongside of each other, with highly favourable results as distinguishing the latter agency, and that visits of inspection by any members of the Society would be welcomed. The discussion pretty well included the entire practical range of the subject by way of passing touch, digressing upon the Lucigen Light novelty, the "Portable Sunlight" variety, also oil-gas, and incidentally water-gas, with the ultimate result of showing that, in the West of Scotland at least, there is as yet not a scrap of assured foothold from which to hold forth with any approach to certainty. Mr. Rowan, replying to a pointed question, admitted that while in certain out-of-the-way cases where coal fuel was only to be got at a ransom, and where oil possessed a natural habitat or was readily come by, the latter, for steam-ship propulsion, held the field easily; in the open contest marine engineers were not at all drawn to the new aspirant. It was yet altogether in the future to determine the extreme potential limits of fuel in the liquid and gaseous forms. The present was the age of experiment only, and of groping, so to speak.

It will be seen that the value of Mr. Rowan's excellent paper, and of the discussion to which it gave rise, is confined to the element of ventilation merely, and so far its tendency will no doubt be useful and progressive.

### LONDON SECTION.

ON Monday last, March 5th, Mr. A. M. Chance, of Birmingham, read a paper before this Section, on "The Recovery of Sulphur from Alkali Waste by means of Lime-kiln Gases." He first treated of the earlier experiments which had been made on this subject, and pointed out that the chief difficulty lay in getting a regular and constant stream of gases of constant composition.

He said: The method and the apparatus* by which we thus obtain these gases of regular and constant composition I will now proceed to describe. It is well known that a mixture of alkali waste and water may be completely decomposed, with production of carbonate of lime and sulphuretted hydrogen, by passing through it, preferably in a series of vessels, gases containing carbonic acid, such as those evolved from a closed lime-kiln; but the sulphuretted hydrogen so produced is diluted by such large and varying quantities of other gases that it cannot easily be turned to account.

By the invention, which I am about to describe, the sulphuretted hydrogen obtained is accompanied by a *much smaller* and *very constant quantity* of other gases, so that it may

* See British Patent, No. 8,666, June 16th, 1887.

be burned directly for the manufacture of sulphurous and sulphuric acids, or be profitably treated for the production of sulphur by the Claus kiln previously described.

To carry our invention into effect we introduce the mixture of alkali waste and water, preferably as a thin cream from which the coarser portions have been removed by means of a sieve, into a series of vessels, connected by pipes and furnished with inlet and outlet ways, and pump through some or all of such vessels lime-kiln gases, such gases consisting almost entirely of carbonic acid and nitrogen.

When these gases, entering the first vessel, come into contact with the mixture of alkali waste and water, the carbonic acid is absorbed by any free lime present with production of carbonate of lime, and by the sulphide of calcium with production, in the presence of water, of carbonate of lime and sulphuretted hydrogen. The sulphuretted hydrogen thus formed, being driven forward, passes into another vessel, where it meets with a further quantity of alkali waste and is absorbed with production of sulphydrate of calcium ($Ca H_2 S_2$).

By this process of what may be termed "two-fold absorption," first of the carbonic acid and then of the sulphuretted hydrogen, the gases issuing for a time from the last vessel contain neither carbonic acid nor sulphuretted hydrogen, or merely traces thereof; they are allowed to escape, passing, however, as a precautionary measure, through a purifier containing oxide of iron or lime.

The first point achieved by our process is therefore the elimination of a considerable quantity of inert, diluent gases, chiefly nitrogen, which are allowed to escape, leaving the remaining gases proportionately enriched.

When we find that the gases issuing from a certain vessel contain a large proportion of sulphuretted hydrogen, in consequence of the fact that the carbonic acid is now acting upon the calcium sulphydrate formed as above mentioned, and that, therefore, for each equivalent of carbonic acid absorbed, two equivalents of sulphuretted hydrogen are being evolved,

$$CO_2 + Ca H_2 S_2 + H_2 O = Ca CO_3 + 2 H_2 S,$$

we close the outlet from the last vessel and open another outlet from the intermediate vessel from which the sulphuretted hydrogen is issuing in sufficient strength.

The gases thus doubly rich in sulphuretted hydrogen, enriched firstly by the removal of a considerable quantity of the inert gases, and secondly by the decomposition of the sulphydrate just described, now contain sufficient sulphuretted hydrogen to render them fit for profitable treatment.

We therefore conduct them away separately, as long as they continue to contain sulphuretted hydrogen in sufficient quantity, to a gasholder, whence they are utilised for the purpose of making sulphur or sulphuric acid. When the gases cease to be sufficiently rich in sulphuretted hydrogen, we close the outlet, and having emptied the first vessel or vessels in which the decomposition of the alkali waste has been completed, and filled another or others later in the series with a fresh mixture of alkali waste and water, we resume our operations as at first, and so proceed continuously.

After the complete decomposition of the waste has been effected, a decomposition so complete that the filtered water does not blacken or darken when a solution of a lead salt is added, the mixture which remains behind consists chiefly of precipitated carbonate of lime in the shape of mud, which may be used in the black-ash furnaces in the place of limestone.

The value of this mud for black-ash making is considerably enhanced by the presence, in the condition chiefly of bicarbonate of soda, of various salts of soda, contained in the original vat waste, and converted into bicarbonate by the action of the carbonic acid gases.

The value of the soda thus recovered may be estimated by the fact that, of the quantity of soda now thrown away in the vat waste and lost, from 2½ to 3 tons may thus be recovered and saved for every 100 tons of alkali produced, by those who are able to utilise the carbonate of lime for black-ash making.

Another profitable method of utilising this carbonate of lime lies in the direction of cement making, for which it seems in many respects well adapted, and to which I called attention in my paper at Liverpool in 1883.

The carbonate of lime recovered by our process compares very favourably for cement making with that which we formerly recovered by the Schaffner and Helbig process, and we have now under consideration several proposals by which the recovered carbonate of lime may be profitably employed in the manufacture of cement.

The water remaining behind, though somewhat dirty in appearance as it leaves the carbonator, is almost clear when filtered; it need not be any source of embarrassment, as we have ourselves during a series of many weeks used it continually over and over again for mixing with the fresh vat waste. It may also be used in the black-ash vats, or may be disposed of by such other means as may happen to be locally available and convenient.

The plant required is extremely simple. From a lime-kiln, erected on any convenient site with powerful carbonic acid gas pumps placed by preference close to it, the gases can be delivered to any convenient distance through a main to the carbonators; these should be placed close to the vats, so as to secure the cheap and quick transfer of the waste from the vats to the carbonators, and to avoid the exposure of the waste to the oxidising action of the air.

A set of seven cylinders, 15 feet high by 6 feet in diameter, should suffice to treat the waste from 300 tons of sulphate of soda per week; but a glance will suggest the advantage of erecting a double set of cylinders, of dimensions calculated to treat one-half of the waste in each set, to be worked so that one set is giving off the useful sulphuretted hydrogen gases, whilst the other set is discharging the useless or inert gases, and thus a constant flow of strong sulphuretted hydrogen gases would reach the gasholder.

The site of the gasholder should be selected, as far as practicable, in a conveniently open situation.

It now remains for us to consider the cost of recovering sulphur by our process, whether in the form of brimstone or of sulphuric acid.

According to the figures I gave in 1883, about 3d. per unit of sulphur was generally regarded as the cost of the recovery of sulphur from alkali waste by the Schaffner and Helbig process.

The same royalty still holds good, 1s. per ton of saltcake balled, and the one manufacturing item common to both processes, the cost of obtaining and pumping the lime-kiln gases, remains, but every other item is either greatly reduced or altogether unnecessary. The outlay for plant is reduced by one-half, and the absence of wear and tear in this process is as remarkable as was the excessive wear and tear in the Schaffner and Helbig process.

The labour required is not so great as that required for breaking and wheeling pyrites, for removing burnt cinders and working the pyrites kilns, whilst the heavy outlay for magnesium chloride and for coal is entirely dispensed with, as neither is now required. From first to last, with the exception of the fuel required to generate steam for pumping the carbonic acid and for driving such machinery as is common to both processes, *no coal whatever is used*.

The current cost of working the process is thus simply reduced to that of obtaining and pumping carbonic acid from one or more lime-kilns, which cost, varying in each locality with the local values of limestone and of coke, each manufacturer can estimate locally for himself.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

THE local market is still undisputably a declining one, especially for the coarser sorts, and while a further fall is to be noted in three or four of the lines, there is hardly more than one showing any signs of recuperation. Nitrate of soda is this exception, being fairly strong under the influence of a rather lively continental demand reported, and not unlikely to mark a further improvement before the end of the week. A partial cause of the Scottish depression is the comparative inactivity of the dyeworks and cloth printing factories of the quarter, further aggravated since the close of last week by the total destruction of one of the latter by fire. The position of sulphate of ammonia is nominally £12. 5s., but some dealers well held would part for something lower, possibly at £12. 2s. 6d., and the chances of any residual recovery under the prompting of the current spring consumption are not now regarded as at all bright. The season's needs must by this time have been pretty fully provided for. Soda crystals have dropped a fraction, also caustics and chlorate of potash. Paraffin products are all quieter, and the time for fancy prices in burning oil is now about fully spun out. General prices current are:—Soda crystals, 40s. 6d. net Tyne; alum, in

lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £46 net Glasgow; soda-ash, 48/52° 1d., less 5 °/₀ Tyne; caustic soda, white, 76° £8. 2s. 6d., 70/72° £6. 17s. 6d., 60/62° £5. 17s. 6d., and cream, 60/62° £5. 16s. 9d.; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52° 1½d., less 2½ °/₀ Tyne; saltcake, 21s. 6d., less 2½ °/₀ f.o.r. Glasgow; bleaching powder, £7. 12s. 6d. to £7. 15s., less 5 °/₀ f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 °/₀ and 6 °/₀ to Scotch and English buyers respectively; nitrate of soda, 9s. 10½d.; chlorate of potash, 5⅝d., less 5 °/₀ any port; sulphate of ammonia, £12. 5s, f.o.b. Leith; sulphate of copper, £22; paraffin scale, hard, 2 1/16d., soft, 2d.; paraffin wax, 120° semi-refined, 2 1/16d.; paraffin spirit, 5d.; burning oil, 6d. to 6½d.; lubricating oil, 885° £6. 15s. to £7., 890/95° £7. 15s. to £8. Western imports for last week included 8,114 tons iron ore, 350 tons limestone, 2,263 tons pyrites of copper, 300 barrels of rosin, and 150 bags of sulphate of barytes.

## THE LIVERPOOL MINERAL MARKET.

The improved tone of our market is unchanged this week. Manganese: Importations have increased somewhat, but, going into consumption straight away, stocks are practically unchanged. Magnesite (containing 98 per cent. of carbonate of magnesia) rules steady; prices unaltered at 30s. to 35s. for raw lump; raw ground £6 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand) continues in demand at 20s. for lump; seconds, 15s.; thirds, 12s.; ground 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: There are more arrivals, but the slight advance reported last week has been more than maintained—80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate) still scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; gray, 32s. 6d. to 40s. Pumice-stone: More inquiry; ground, £6 10s. to £7; specially selected lump, finest quality, £9 to £10 10s. Iron ore: Improvement maintained; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone in fair demand at £5 5s. to £5 15s. for lump; and smalls, £5. Fluor and felspar quiet. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy 2s. per lb. Chrome ore: The demand last reported continues, and prices are firm. Antimony ore from £15. to £16 for fair quality. Antimony metal from £49 to £50. Uranium 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potter's lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 6os. to 8os. Strontia steady; sulphate (celestine) 17s. 6d.; more doing. Carbonate (native), £15 to £16.; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 per cent. packed, £11. 2s. 6d.; 70 per cent. packed, £10; 60 per cent. packed, £8. 16s.; 50 per cent unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. Spiegel, 20 per cent., £4. 12s. 6d. Silicon spiegel, 9 per cent., £8; chrome pig, 9 to 10 per cent., £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

Our market this week has continued steady. Soda-ash, 1d. up. Caustic soda: 60 per cent. white at £6; 60 per cent. cream, £5. 17s. 6d.; 70 per cent. white, £7; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. od. Nitrate of soda: There is little improvement at 9s. 9d. to 10s. od.; cargoes 3d. to 6d. lower. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder, £7. 15s. to £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 22s. od. Bichromate of potash, 4⅝d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6½d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 23s. to 24s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11. Lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. od. Sulphur: Roll, £6. 15s. od.; flour; £9. 5s.; best thirds, £4. 10s. Sulphate of copper, £21. 10s. to £22. Blanc fixe, £8. 10s. Manganese: Sulphate, £18; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 32s.; grey, 31s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc, (solid) £18. Hyposulphite of soda, dry and white, £5. 15s. Pearl ash, 40s. to 42s. 6d,

## THE LIVERPOOL COLOUR MARKET.

Colours steady Ochres: Oxfordshire £10, £12, £14, and £16; Derbyshire, 50s. to 55s.; Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d.; Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto, for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

Prices show but slight alteration, and until there is some decided improvement in general trade advances can scarcely be looked for. To some extent the movements of the metal market are affecting chemicals. Copper and lead salts are both firmer, and there is more inquiry for acetate of lead which is rather scarce on the spot. Litharge and nitrate of lead are also dearer. The position of ammonia products is on the whole without change. Acetate of lime has been selling more freely at the lower prices, and for future delivery is firmer. Tar products all round continue to meet with ready sale, and the prices of carbolic acids are well maintained. Alum is slow of sale and weak in price. Sulphate of alumina is lower in price, owing to greater competition in manufacture of the article; quality and price vary considerably. Potash, carbonate and caustic, are still in good demand. Other alkalies are unchanged in position, and values unless caustic soda, may be considered a shade weaker. Bleaching powder has improved a little. Chlorate of potash unchanged.

## THE TAR PRODUCTS MARKET.

London advices show that 90's benzol is quoted at 3s. 4½d. and 50/90's at 2s. 7d., but the Manchester market is so quiet that it is impossible to fix a price there. The quoted prices are only nominal. Crude carbolic acid is very firm, and quotations upon which actual business is being done is now a trifle over 4s. for 60's. Anthracene is also firmer, and 1s. 3d. is now the value of 30 °/₀ B quality. Creosote is in good demand still, and the outlook for coal-tar pitch is much brighter, although prices have not much improved.

## THE SULPHATE OF AMMONIA MARKET.

Speculators would have us believe that sulphate of ammonia is likely to go lower, but the turn the weather has taken during the last few days will perhaps cause a considerable demand and a hardening of prices. Beckton still keeps nominally at £12. 15s., though business has been done in

London outside makes at considerably lower prices. Hull price may be taken as £12. 5s., and this is Leith value also, while Liverpool remains at £12. 2s. 6d. to £12. 3s. 9d. A good sign is the lowness of stocks everywhere, so that if a good demand springs up there is nothing for it but a rise in price.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

H. Lee & Co., Birmingham, electricians, as far as regards A.Lee.
Sutherland, Cycles & Co., Longton, china manufacturers, as far as regards H. M. Mercer.
T. Marshall, T. Vickers, J. R. Spencer, and W. D. Blackman, Beverley, under the style of the East Riding Ærated Water Company, as far as regards J. R. Spencer and W. D. Blackman.
Colby & Durrell, Norwich, leather curriers.
Lockwood & Co., Woodbridge, Suffolk, brewers, as far as regards E. St. G. Cobbold.
Lee & Hardcastle, Dewsbury, drysalters, etc.
W. E. J. Briggs and G. H. Horsfall, Liverpool, iron and steel galvanisers, under the style of the Chillington Galvanising Company.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Egelstaff, Edwin Herbert (trading as the Hecla Stone Company), Chepstow, quarry master and stone merchant.
Grady, John, Birmingham, general japanner, etc.

#### Adjudications.

Dalton, George Grubb, Linthorpe and Middlesbrough, brick manufacturer, etc.
Egelstaff, Edwin Herbert (trading as the Hecla Stone Company), Chepstow, quarry master.
Marcus Harris, Fleetwood and Manchester, indiarubber manufacturer.

#### First Meetings and Public Examinations.

Pollard, Arthur, Derby-road, South Hackney, late of Roman-road, North Bow, London, oilman. March 15, 33, Carey-street, Lincoln's Inn. March 22, 34, Lincoln's Inn Fields, London.

#### Notices of Dividends.

Fourness Henry (formerly trading as Henry Fourness and Co.), Chorlton-upon-Medlock, Manchester, gas engineer. First and final dividend of 20s. and 4 per cent. interest, March 8.
Lindsay, David (trading as the Tyne Paint Company), South Shields and Newcastle-on-Tyne, oil and paint merchant. First dividend of 6d., March 12, Official Receiver's Office, Newcastle-on-Tyne.

# New Companies.

Adamant Cement Company Limited.—Capital, £50,000 in £10 shares.
Bournemouth Electric Light and Power Company Limited. Capital, £4,000 in £5 shares.
British Gas Meter Company Limited.—Capital, £10,000 in £20 shares.
Castlecary Fire Clay Company Limited.—Capital, £10,000 in £5 shares.
Dabel's Pure Milk Syndicate Company Limited.—Capital, £4,000 in £10 shares.
Explosives and Ammunition Manufacturing and Testing Works Company Limited.—Capital, £10,000 in £1 shares.
Gas Patents Syndicate Company Limited.—Capital, £25,000 in £5 shares.
Gulcher (New) Electric Light and Power Company Limited. Capital, £70,000 in £1 shares.
James Chambers & Co. Limited (Soapmakers).—Capital, £20,000 in £10 shares.
London Dairy Company Limited.—Capital, £100,000 in £5 shares.
Paper Fibre Company Limited.—Capital, £60,000 in £20 shares.
Scandinavian Stove Company Limited.—Capital, £5,000 in £1 shares.
Shaftesbury Automatic Safety Lamp Company Limited.—Capital, £100,000 in £5 shares.
Union Dairy Company Limited.—Capital, £100,000 in £1 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

#### APPLICATIONS FOR LETTERS PATENT.

**Gas Burners.**—(Complete Specification.) J. F. Wright and G. E. Wright. 2739. Feb. 24.
**Boiler Construction.** T. Sugden and E. Binns. 2746. Feb. 24.
**Waterproof Fabrics.** P. M. Matthew, jun. 2756. Feb. 24.
**Gas Lamps.** C. M. Walker. 2759. Feb. 24.
**Softening and Purifying Water.** R. E. Phillips. 2761. Feb. 24.
**Disinfecting and Purifying Sewage.** R. E. Phillips. 2762. Feb. 24.
**Utilising Sewage Refuse.** C. F. Newman. 2763. Feb. 24.
**Pumps for Raising Fluids.** S. H. Wright. 2767. Feb. 24.
**Instantaneous Water Heaters.** W. J. Righton. 2775. Feb. 24.
**Producing Sodium Oxide.** F. Trickett and J. Noad. 2777. Feb. 24.
**Extraction of Gold, Silver, and Platinum.** F. Trickett and J. Noad. 2778. Feb. 24.
**Heating Water and other Liquids.** W. J. Payne. 2779. Feb. 24.
**Hydraulic Presses.** R. H. Tweddell, J. Platt, and J. Fielding. 2783. Feb. 24.
**Soap Tablets.** J. Meek. 2796. Feb. 24.
**Artificial Stone.** J. Brunton and L. Griffiths. 2803. Feb. 24.
**Distillation of Shale.** R. B. Tennent. 2810. Feb. 25.
**Pipe Joints.** H. Rallings. 2811. Feb. 25.
**Briquettes.** G. Moir. 2813. Feb. 25.
**Utilisation of Heat from Coke Ovens.** W. Williams. 2816. Feb. 25.
**Sulphide of Calcium and Sulphurreted Hydrogen.** E. W. Parnell and J. Simpson. 2831. Feb. 25.
**Manufacture of Bricks.** W. Illsley. 2833. Feb. 25.
**Lithographic Ink.** C. Hayward. 2852. Feb. 25.
**Regenerative Gas Lamps.** E. Fullford, and H. T. Van Laun. 2853. Feb. 25.
**Manufacture of Bread.** S. R. W. Humphries. 2856. Feb. 25.
**Manufacture of Bread.** S. R. W. Humphries. 2857. Feb. 25.
**Oxygen and Nitrogen from Atmospheric Air.** H. Tipping. 2858. Feb. 25.
**Treatment of Sewage.** F. M. Lyte. 2863. Feb. 25.
**Oil of Birch Tree Bark.**—(Complete Specification.) E. Tuthill. 2870. Feb. 25.
**Manufacture of Aluminium.** Baron de Overbeck. 2872. Feb. 25.
**Making Alumina from Clay.** Baron de Overbeck. 2873. Feb. 25.
**Alumina and Sulphuric Acid from Sulphate of Alumina.** Baron de Overbeck. 2874. Feb. 25.
**A Steam Forcer.** R. Curson and F. Curson. 2895. Feb. 27.
**Regenerative Steel Furnace.**—(Complete Specification.) J. Riley. 2899. Feb. 27.
**Manufacture of Steel.** P. M. Parsons. 2903. Feb. 27.
**Smoke-Consuming Cooking Stoves.** P. Clark. 2904. Feb. 27.
**Gas Engines.** W. von Oechelhaeuser. 2913. Feb. 27.
**Mills for Grinding Corn.** W. C. Hamann. 2915. Feb. 27.
**Basic Lead Salts.** F. M. Lyte. 2920. Feb. 27.
**Impregnating Liquids with Carbonic Acid.** C. J. Caspers. 2921. Feb. 27.
**Regulating the Force of Dynamos.** H. J. Haddan. 2933. Feb. 27.
**Cooling Apparatus for Provisions.**—(Complete Specification.) A. J. Boult. 2935. Feb. 27.
**Smoke-Consuming Apparatus.** J. C. Inskeep. 2944. Feb. 28.
**Back Pressure Valves for Measuring the Flow of Water.** N. J. Ginman. 2945. Feb. 28.
**A Thermoteleloge.**—(Complete Specification.) L. Nievsky, W. J. B. Humphreys, and H. F. Dale. 2951. Feb. 28.
**Apparatus for Brewing Beer.** T. Bradbury. 2962. Feb. 28.
**Sighting the Interior of Closed Vessels.** J. Clark and T. S. McInnes. 2963. Feb. 28.
**Drying Textile Material in the Skein or Hank.** F. W. Petrie and J. Fielden. 2965. Feb. 28.
**Manufacture of Cement.** R. Stone. 2984. Feb. 28.
**A Water Jet.** A. J. Eade and A. Eade. 2988. Feb. 28.
**Incandescence Gas Burners.** C. von Buch. 2991. Feb. 28.
**Obtaining Clean Water from Rivers.** S. A. Johnson. 2995. Feb. 28.
**Actinic Light.** O. Eckenstein. 3004. Feb. 28.
**Apparatus for Heating and Evaporating.**—(Complete Specification.) S. M. Lillie. 3006. Feb. 28.
**Varnishing Metal Goods.** C. Harrop. 3008. Feb. 28.
**An Improved Fertiliser.**—(Complete Specification.) P. C. Jensen. 3013. Feb. 28.
**Centrifugal Machines.** O. Braun. 3014. Feb. 28.
**Yellow Colouring Matters.** J. Imray. 3016. Feb. 28.
**Indicating the Flow of Liquids or Gases.** C. D. Abel. 3017. Feb. 28.
**Coating Metal Sheets with other Metals.** H. W. Buddicom. 3018. Feb. 28.
**Vapour Motor Engines.** C. D. Abel. 3020. Feb. 28.
**A New Barometer.**—(Complete Specification.) T. H. Blakesley. 3021. Feb. 28.
**Washing or Purifying Gas.** S. Chandler, jun., and J. Chandler. 3024. Feb. 28.
**Revolving Tables for Sorting Minerals.** L. Wilson. 3047 Feb. 29.
**Rotary Engines.** J. Stebbing. 3069. Feb. 29.
**Apparatus for Testing Wheat Flour.** L. C. Porter. 3079. Feb. 29.
**Machinery for Agglomerating Fuel.**—(Complete Specification.) N. Fouquemberg. 3082. Feb. 29.
**Production of Hydrargyrum Compounds.** L. Merck and E. Memel. 3094. Feb. 29.
**Artificial Light for Photography.** C. Neve and F. Bishop. 3103. Feb. 29.
**Manufacturing Articles of Animal Hide.**—(Complete Specification.) J. Leigh, W. Leigh, and A. Ashworth. 3112. March 1.
**Treating Carbonated Alkali Waste.** A. M. Chance. 3122. March 1.
**Improvements in Treating Vat Waste.** A. M. Chance and J. F. Chance. 3124. March 1.
**Glass Bottles.** D. Rylands and B. Stoner. 3127. March 1.
**Steam Generator.** W. Hök. 3129. March 1.
**Treating Sulphide of Ammonium to obtain Sulphuretted Hydrogen.** A. M Chance and J. F. Chance. 3134. March 1.
**Brickmaking Machine.** H. Watkinson and H. Partington. 3144. March 1.
**A New Non-Magnetic Alloy.** H. Ostermann and C. Lacroix. 3146. March 1.
**Mills for Pulverising.**—(Complete Specification.) W. P. Thompson. 3147. March 1.
**Cement-Making from Lime Mud Residue.** J. S. Rigby. 3148. March 1.
**Grids for Gas Purifiers.** E. Lowe. 3159. March 1.
**A New Food Compound.**—(Complete Specification.) S. Henderson and A. Henderson. 3161. March 1.
**Manufacture of Sulphuric Acid.** E. B. Ellice-Clark. 3165. March 1.
**Manufacture of Sulphuric Anhydride.** E. B. Ellice-Clark. 3166. March 1.
**Regulating the Supply of Gas.** J. Osgerby and J. Lea. 3169. March 1.

# PRICES CURRENT. [THURSDAY, Mar. 8, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 9 | 3 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3½ |
| Picric | ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 5 | 0 |
| ,, ( ,, 150°) | ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6½ |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3⅛ |
| ,, =24° | ,, | 0 | 0 | 1⅝ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 0 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 6 | 3 |
| ,, ,, (grey), Hull | ,, | 12 | 5 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8½ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 8 | 0 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 5 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 4½ |
| ,, 50/90 ,, | ,, | 0 | 2 | 7 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 3 |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 4 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1⅜ |
| Copper (Chili bars) | per ton | 81 | 15 | 0 |
| ,, Sulphate | ,, | 22 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 75 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 16 | 5 | 0 |
| ,, Litharge Flake, ex ship | ,, | 16 | 10 | 0 |
| ,, Acetate (white) | ,, | 27 | 10 | 0 |
| ,, ,, (brown) | ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 0 | 0 |
| ,, Nitrate | ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 10 | 0 |
| ,, ,, (grey) | ,, | 13 | 15 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 18 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent | ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 9 |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 4 | 0 |
| Cotton-seed | per ton | 20 | 10 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 6½ |
| ,, American | ,, | 0 | 0 | 6¾ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 6 |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 6 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % | per ton | 10 | 0 | 0 |
| ,, Muriate, 80 % | ,, | 8 | 10 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 7½ |
| ,, Nitrate | ,, | 0 | 2 | 7½ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 16 | 3 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 11 | 3 |
| ,, ,, (Soda Crystals) | ,, | 2 | 7 | 6 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 20 | 0 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 30 | 10 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 8 | 7 | 6 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 10 | 0 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 15 | 0 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 16 | 3 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 15 | 0 |
| ,, Bicarbonate | ,, | 5 | 5 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 10 | 3 |
| ,, Nitrite, 98% | per ton | 28 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5⅜ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 12 | 6 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 5 | 0 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 14 | 6 |
| ,, Cane | ,, | 0 | 18 | 6 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 8 |
| ,, Barium | ,, | 0 | 0 | 5¼ |
| ,, Copper, 60% | ,, | 0 | 0 | 9 |
| Sulphur (Flowers) | per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool) | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 2 | 6 |
| Tallow | ,, | 26 | 15 | 0 |
| Tin (metal) | ,, | 160 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) | per ton | 19 | 5 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

42, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, March 17, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.

## SPECIAL NOTICE.

IT is our intention at an early date to introduce a new feature in the pages of the *Chemical Trade Journal*—one that we feel sure will commend itself to our numerous circle of readers, seeing that nothing of the kind has ever been attempted before in connection with the Chemical and Allied Industries.

We propose to issue a weekly summary of the chemicals and articles of a kindred nature exported from and imported to the principal seaports in the United Kingdom, commencing in the first instance with the five following ports, viz., London, Liverpool, Glasgow, Hull (with the Humber ports), and Newcastle-on-Tyne.

Those of our readers who are acquainted with the sources of information available for the purpose, will not need to be told of the vast amount of labour, not to mention expense, involved in the proposed compilation, but believing as we do that the information will be of the greatest practical value to our subscribers, we shall spare no pains in compiling and presenting in our pages a handy and reliable record from week to week.

Any suggestions that our subscribers may have to offer in connection with this matter will be gladly received and duly considered.

## SULPHUR RECOVERY.

TO show the need of a careful study of chemical engineering by those who have charge of the manufacture of heavy chemicals in this country, a more apt illustration than the recovery of sulphur from alkali waste could scarcely be imagined.

Fifty years ago—and a similar period has more than once seen the completed cycle of several industries, from their rise to their fall again—the late Mr. William Gossage patented the use of alkali residuum for obtaining therefrom sulphuretted hydrogen by means of muriatic or carbonic acid. In Mr. Gossage's experiments the sulphuretted hydrogen was found to be contaminated with carbonic acid, and this latter gas was eliminated by exposing it to another portion of alkali residuum. We believe that this process, or at least one very similar in its operation was carried on for some time at the works of the Patent Alkali Company at St. Helens, but was eventually abandoned for several reasons. Gossage's patent, already alluded to, is dated August 17, 1837, No. 7,416.

In October of the next year, John Fowler (October 16, 1838, No. 7,831) obtained letters patent for reducing sulphate of lime to sulphuret of calcium, and evolving sulphuretted hydrogen from this by means of carbonic acid.

As early as February, 1857, Gossage had found that the diluent gases accompanying the sulphuretted hydrogen interfered with the production of vitriol by its use, and by this discovery was led off from the right path into another series of experiments which did not turn out satisfactory, and so the subject has remained unsolved until the present day, when Mr. Alexander Chance has shown how the Gordian knot may be loosened.

And how has this come about? The chemical reactions which take place in the Chance process have been known to almost every chemical tyro for years; there is nothing new on that score. Mr. Chance does not create any new machinery which was not in existence before, so that his success is due to a dogged determination to overcome the difficulties which had proved unsurmountable to former experimentalists, by careful attention to details, and to carry out the

chemical operations already so well known to be perfect in the laboratory to equal success on the large scale. This is what we call chemical engineering.

But there is another side to look at. We fear that in many works there is not much inducement for the chemist to do any more work than is allotted to him, and we know ourselves of many instances where the chemist has been kept as a mere drudge, instead of allowing him to have a status in the works commensurate with the knowledge he is called upon to possess; and in not a few cases he has been the underling of the foreman, whose sole idea is that science and practice will not work together. The ammonia-soda process and the Chance sulphur recovery process should now teach manufacturers a lesson.

And when we come to that portion of the sulphur recovery process that relates to the recovery of the sulphur as such, is there anything new here? We have only to turn to the patent of Mr. Harrison Blair, of February 18, 1858, No. 313, relating to the "recovery of sulphur which has been used in the manufacture of soda-ash," to furnish us with the answer. We shall find therein described a process for the separation of the sulphur from its combination with hydrogen by means of combustion with such a quantity of air as will support a flame, but be insufficient to provide oxygen for the combustion of the sulphur therein contained. The details of this, worked out, constitute the Claus process.

The Chance process has been already described in these columns. It seems to be a comparatively simple one, and likely to be adopted by all who have money to spare for the capital outlay, but how far it may ultimately bless the Leblanc soda trade remains to be seen. The alkali makers have for a long time been seeking rest and finding none; in fact, they are now on the horns of a dilemma, and some of them are just saying that by adopting the process they may be jumping out of the frying pan into the fire.

First of all the new process will require a further expenditure of capital. Those who have not the money to spend will probably succumb under the oppression of still lower prices for soda, unless they are fortunate enough to participate in the compensatory advantages enjoyed by those who make bleach.

But when the capital is spent, will the pyrites companies step in and say, "You can have our sulphur for one penny per unit," or even less, so that they may have the copper in a convenient form for extraction. The open air calcinations in Spain will render it all the more necessary for the pyrites companies to give the sulphur contents free, or for a trifle, for the sake of the copper, but as most of the alkali makers have contracted for about three years ahead at 4½d. per unit, the position cannot be materially changed in the meantime, unless the alkali makers who adopt the recovery process can, by their contracts, take a reduced quantity of pyrites commensurate with their requirements, and this is very questionable.

The law says *caveat emptor*, and the pyrites companies will naturally ask, "What does the bond say," or they may see how the wind blows and trim their sails for future fair weather by making a general reduction in price, and then those who have spent their money upon sulphur recovery will be worse off than those who have not.

This little cloud may be as yet no bigger than a man's hand, but it will undoubtedly be felt; and so also, most probably, will the production of alkali from sulphate of soda without the encumbrance of vat waste have to be calculated upon, before this or any other process for treating vat waste has become general. However this may be, an immediate saving of 10s. to 15s. per ton upon 60 % caustic soda is a fact which the ammonia-soda process has to face, and an advantage which the makers of Leblanc soda must take advantage of or perish in the attempt.

## SOCIETY OF CHEMICAL INDUSTRY.

AT a meeting of the Liverpool section, University College, Liverpool, on Wednesday, the 7th inst., Mr. Thomas Fletcher, F.C.S., read the following paper on "A new commercial application of oxygen":—

The want of some simple method of obtaining a powerful source of heat under perfect control is an experience, and often an unpleasant one, which all who have charge of machinery and chemical plant must have felt more or less frequently. Up to the present time the only practical methods have been either the use of a basket of live coke or a blowpipe connected to the nearest gas supply. Neither of these methods is satisfactory in many cases, and, to overcome the difficulty, I have devised some special forms of blowpipes which can be used with the ordinary coal-gas supply and compressed oxygen made by the Brin process. These blowpipes are essentially different from the usual form, and also from the well-known mixing jet, the latter requiring both gas and oxygen to be equally compressed, which at once excludes it as an emergency arrangement for repairs and accidents. It is pretty well known that air gas produced from gaseline vapour, when used with an air blast in a blowpipe, is peculiarly liable to be extinguished; the speed of combustion is sufficiently slow to enable the flame to be blown out, or away from the unburnt vapour, with the greatest ease, probably owing to the fact that the gasoline is not diffused through the air as a true gas, but as a vapour, which requires further heating and considerable expansion before it will burn. On this point I have a rather pretty experiment here, showing how the particles of vapour in the so-called air-gas, burning separately, the flames of the separate suspended beads of gasoline vapour being distinctly visible as independent centres of combustion. When we apply an oxygen blast to gasoline vapour this brittleness or want of persistence disappears, but owing to the air mixed with the vapour, the temperature obtainable is far lower than that from permanent combustible gases, and up to the present time high temperatures have not been obtained with blowpipes using the light petroleums owing to the necessary mixture of air to obtain the vapour. We must not forget, when gasoline or benzoline vapour is used, that it has one special point in its favour for some classes of work in the fact that the products of combustion are quite free from sulphur, which in many ways is a great source of trouble in laboratory work. The use of a petroleum or spirit spray, if it were practicable, would overcome the difficulty of the admixture of air; but the spray formed by an oxygen blast is of a most unpleasantly uncertain and explosive nature, so much so that after my own experience I can only give a strong caution as to the excessive care required to prevent disastrous accidents. A spray burner may start and work satisfactorily, and then suddenly, without any apparent cause, the whole apparatus may be shattered into fragments. When we burn a permanent gas, such as hydrogen or coal-gas, in a blowpipe with an air blast, the flame will bear a heavy air pressure on the jet, giving a correspondingly high temperature flame. If we take the same permanent gas, and use it with a jet of oxygen instead of air, the persistence and "toughness" of the flame is again greatly increased, the speed of traverse of flame backwards is so great that the amount of combustion which may be going on in a given space is almost unlimited, and enormously high temperatures can, therefore, be obtained with the greatest ease, the absence of nitrogen in the flame, of course, greatly assisting the result by reducing the loss of heat, and we gain also by the smaller area of flame containing a given number of available units of heat.

In the construction of powerful blowpipes for compressed oxygen, and coal-gas at ordinary pressures, the form of the jet is a very important matter. The centre jet, instead of being formed with a single hole (except in the very smallest sizes), should be flat on the end, and drilled with a circle of very fine holes, each large enough to pass from three to four cubic feet of oxygen per hour at a heavy pressure. The gas outlet which surrounds this jet should be an annular space about $\frac{1}{16}$ inch wide surrounding the jet, and should project $\frac{3}{8}$ inch beyond the tip of the jet, this projection being the same in all sizes and powers. Such an arrangement is useless

for a gas and air blowpipe, as it extinguishes itself instantly, and some amount of experimenting has been necessary to arrive at the details now given. I have here three sizes of these blowpipes, requiring respectively about 7, 20, and 40 cubic feet of oxygen per hour; and with a small bottle of compressed oxygen, which can readily be carried under the arm, I will now give you some idea of their power. The quantity of oxygen required for each has not been measured by myself, but has been estimated from a bottle supplied by the Brin Oxygen Company, which I was informed contained 20 cubic feet, and which supplied the largest blowpipe at full power for half-an-hour continuously. The smallest of these blowpipes will fuse the end of a 3-16 wrought-iron rod: the next size will do the same with a ¼ inch wrought-iron rod, or will braze copper pipes ⅛ inch thick about as quickly as a tinman can soft solder light sheet tinned iron. The largest will fuse a hole through a 4 inch wrought-iron steampipe, and will braze, and probably also weld, heavy flanges and couplings on work of the same size. Larger blowpipes can be easily made on the same lines, and it is now both possible and easy to braze and make repairs in parts of complicated machines without removal, in any place into which a man's hand can be got. The heat is so short and so quickly obtained that, with the assistance of wet cloths, polished work or wood lagging can be preserved without injury or mark, within two or three inches from a place where a heavy brazing repair has been done. Breakdowns in copper pipes or vessels can be made good and work restarted in a few minutes which under ordinary conditions would necessitate a stoppage for days. Using the same blowpipe and bottle of oxygen, I will show you, with a block of lime, an emergency light which will often be found useful; amongst other things it will enable you to get by photography a permanent record of any accident or unusual state of things in places where no natural light can be obtained, and where magnesium would fail owing to the dense fumes evolved. This light is, of course, anything but silent; but as we are now considering only works' emergencies, the noise is not of any great consequence. Turning now to the laboratory, as most of you will know, I have identified myself for many years with apparatus for the production of high temperatures for experimental purposes, and the cheap production of oxygen has advanced our powers in this direction very considerably. When any new application of a power is discovered, my own instinctive feeling turns at once to its application in the chemical laboratory, that source from whence a very large proportion of our commercial knowledge and power has originally sprung.

It is not only necessary that a new power shall be known in the laboratory; the most important point from a practical point of view is that it shall be easily and quickly applied to useful research by those whose time is limited, and the elements of time and personal trouble must be eliminated as much as possible.

My first attempts to utilise compressed oxygen for laboratory gas furnaces proved total failures, owing to the intensely local heat evolved, which entailed cutting and destruction of any and every crucible. The direct application of the heat to the contents is in many cases out of the question, and after some experimenting I found that the desired result could be obtained by mixing air with the oxygen blast, so as to increase the size of the flame, and spread the heat more evenly over the surface of the object to be heated. The form used for this purpose is similar to the well-known injector blowpipe, the air jet being, for a small laboratory furnace, ¼ inch bore and open at both ends, behind this is a small oxygen jet pointing directly along it; when the oxygen blast is turned on it carries along with it about four or five times its bulk of air. Having got so far, I was again blocked by the fact that no known casing suitable for gas furnaces would stand the heat obtained, even for a few minutes. The only kind of casings which can be satisfactorily used for laboratory gas furnaces are composed of a mixture of very refractory clay and ground cork or sawdust; when these are fired in a kiln, the woody matter is burnt out, and a porous material is left, which offers a most extraordinary resistance to the passage of high temperatures through it. It is, as is very well-known, an easy matter to fuse cast-iron in a crucible in a casing of this material only one inch thick, before the outside of the casing has time even to become slightly warm to the hand. The objection to this mixture is that the salts contained in the wood or cork are not burnt out, and they remain acting as a flux on the refractory clay, reducing its resistance to fusion to a very serious extent. This difficulty has, however, with the assistance of the Morgan Crucible Company, been at last overcome, and as the increase of power in our guns leads to improvement in armour plates, so has the increase in power of our laboratory furnace burners led to an improvement in the resisting power of the crucible casings which have to withstand their destructive power. By the discovery of a very refractory clay, which has practically the same contraction as the porous mixture, it is now possible to line the furnace casings with a thin layer, which offers an extraordinary resistance both to fusion and also to the action of fluxes. That these casings are only in their preliminary stage, and not at their most perfect point, goes practically without saying, and only a few have been made up to the present time. One difficulty not yet perfectly overcome is the tendency of the refractory lining of the lid to tear loose owing to the thinness and the slight hold available, this is, however, only a question of detail which will shortly be overcome.

With the injector furnace, which is undoubtedly of great value for chemical research, I have been for some years held in check by the fusibility of the casings, and this has of necessity put a very definite limit to the power of the burners which could be employed. As this limit is now, or very shortly will be, greatly extended, there is an opportunity for further experiments on the air and gas burners for ordinary use, irrespective of the new power we have now at command. Using the combined air and oxygen burner with one of the new casings, you will see that any power, from the lowest to the highest, can be obtained with the greatest ease, and without attention, as one of the small oxygen cylinders will work this furnace at full power for about two and a half or three hours, and at lower powers for a correspondingly longer period.

I have already expressed an unfavourable opinion as to the use of gasoline or benzoline vapour for use in open blowpipes, but this objection does not exist with furnaces where the mixture is blown on to a surface at a high temperature, which ensures perfect combustion and persistence of the flame. The only working objection to the oxygen blast in gasoline or benzoline vapour furnaces at present is that a supply of air must be blown through the generator to produce the combustible vapour.

Whilst experimenting, it is the nature of chemists to consider the expense after the money is all gone; in fact, if this were not fortunately the case, very little original work would be done, and, to follow this old-established rule, now the oxygen is gone we will consider the expense. In the first place, owing to the great concentration of the heat, the loss in use is exceeding small, the nitrogen, which in an ordinary blowpipe frame is a source of great waste, is partly or entirely absent, and as a consequence the coal-gas consumed is in practice only about one-sixth of that required to do the same work if an air blast is used. The oxygen, if made on a large scale, can be produced by Brin's process at a cost varying from 2s. to 7s. per 1,000 cubic feet, depending on the quantity made.

In the steel bottles the compressed gas is now sold at from 2d. to 3d. per cubic foot, which is, of course, a high price for work on anything like a commercial scale; but if we keep a few small bottles of compressed oxygen ready for emergencies, their value may, in some case, be more than a thousand times their cost, and the expense becomes, therefore a minor consideration.

It may be well to mention, whilst dealing with this subject, that compressed liquid nitrous oxide has been used for small blowpipes for platinum working, but it is not only very much more costly than compressed oxygen, but it is also not so satisfactory. With the oxygen, repairs of platinum vessels in the laboratory become a very easy matter, and the ordinary forms of blowpipes can be used for this purpose, provided a small jet is used and the outer cap is kept about ⅜in. in advance of the jet. This is necessary to obtain a rough flame for general heating, a fine pointed flame being liable to cause perforation of the vessel instead of producing a broad welding surface. If the compressed oxygen is to be at all freely or generally used, the price charged must be greatly reduced, and judging from the first cost of the gas, I certainly can see no reason why so high a price should be charged, as the bottles last practically for ever, and the cost of compressing must be very small.

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### IS A SAFE NOW A SAFE?

The Secretary, in the discussion which followed the experiments, raised the very serious point that with such apparatus as Mr. Fletcher had exhibited and used, a burglar proof safe no longer existed, as it was simply a question of minutes to fuse a hole large enough for a man to enter in any wrought

iron or steel door in existence. Chilled iron or steel were powerless to resist the small blowpipe Mr. Fletcher used, which would penetrate thick iron and steel plates as readily as ordinary carpenters' tools would penetrate wooden doors.

The apparatus was devised by Mr. Fletcher for works' repairs, and was noisy in action; but, as he explained, the apparatus could be made silent, and small enough to carry in a hand-bag. This is a very serious matter for bankers and others who have valuable property, and one which will have to be taken up at once by the safe and strong room makers. It is very well-known that the professional burglar is ready to utilise the latest applications of science for his own ends; in fact, Mr. Fletcher's furnaces designed to assist in chemical research are well-known as being used by receivers of stolen goods to reduce plate and jewellery to ingots, and these furnaces may be seen in the detectives' museum at Scotland-yard.

Bankers have already taken the alarm, and have visited Mr. Fletcher's works with the object of seeing the extraordinary ease with which large openings can be fused in heavy iron or steel plates. It is hardly necessary to state that Mr. Fletcher plainly declares his intention not to devise a silent form of the apparatus, which naturally would be required only for burglars' use, but the light-fingered profession will no doubt take the matter in hand, and most probably succeed in making the apparatus silent, a modification which Mr. Fletcher states can be made.

During an interview with Mr. Fletcher on this very serious matter, he informed us that the present danger is possibly not so great as it appears, owing to the fact that the apparatus necessary to manufacture and prepare the silent arrangement is both costly and large, and as the person who prepares it must have fixed machinery and plant, he will most probably be one of the last to whom the enterprising burglar would apply for his apparatus.

## RECOVERY OF THE SULPHUR FROM ALKALI WASTE.

DISCUSSION ON MR. CHANCE'S PAPER.

SIR FREDERICK ABEL said although not a manufacturing chemist he had dealt somewhat in practical chemistry, and not long ago had the opportunity in company with Professor Dewar of inspecting the process now described. Some years ago when he saw at Oldbury the attempt to bring the Shaffner and Helbig process to a practical success he was much delighted with the progress then made, and imagined it would be as great a success practically as it was theoretically, but this did not prove to be the case. Undismayed by this, Mr. Chance and his partners, like typical Englishmen, had persevered until they had achieved the results which had now been described. He had examined this process with the greatest interest, and although at first sight he might have been a little dismayed by the elaboration of the apparatus, he was reassured by witnessing the ease by which the process was conducted by the workmen in charge, who simply opened one stopcock and shut another, and tested the richness of the gas in sulphuretted hydrogen from time to time. During the time he spent in the inspection sulphur was concentrated in one vessel and afterwards in another, so that the manufacturers were able from time to time to use the sulphuretted hydrogen gas either for the manufacture of sulphuric acid, or for the production of sulphur, as desired. He was charmed to see that a combination of simple chemical reactions and of simple chemical engineering brought about such excellence, and congratulated Messrs. Chance on what appeared to be the ultimate success which had attended their efforts. With his former colleague Mr. Stevenson, he had at one time to inquire a great deal into the *bête noir* of alkali makers' waste, and quite apart from the question of mercantile profit, had been gratified in watching the progress made towards the recovery of sulphur, which had been in so many ways a mischief rather than an advantage to scientific and practical chemists.

Mr. STEVENSON, M.P., said he had had the advantage on two occasions of visiting and examining very closely the experimental plant at Messrs. Chance's works at Oldbury. The best testimony he could give as to his appreciation of the process was that he persuaded his partner to at once put it into operation. What induced him to come to that conclusion was this: They were all aware of the series of attempts made from the time of Mr. Gossage's downwards to get rid of this *bête noir*, sulphuretted hydrogen gas, which was not only a waste product, but far worse, it was a positive nuisance in many places. He had always felt that if it had not been for the existence of this gas, which was such a nuisance in Lancashire, very likely the Royal commission on noxious vapours would not have been called into existence, and Mr. Chance in showing them the way not only to get rid of this waste, but to turn it to profitable account, conferred a very great advantage not only on the alkali trade but on the public at large, who never entirely sympathised with the efforts of manufacturers in promoting the industry of the country. Previous efforts to produce sulphuretted hydrogen from waste in a combustible form so as to make sulphuric acid of brimstone might have failed because they attempted to obtain a continuous supply of sulphuretted hydrogen, and the great merit and ingenuity of Mr. Chance's process was that the supply was not continuous but intermittent. He felt very much puzzled at first sight at the combination of taps and pipes, and after visiting the works for the first time requested Mr. Chance to put on paper a complete round of operations lasting through an entire day, recording hour by hour the taps which were opened and the gases evolved. In order to make the thing clear to his own mind, without which he should not have understood it, he made a sketch of these operations on paper which Mr. Chance had adopted as his diagram; and what struck him about it was the remarkable symmetry of the operations—although there was apparently an extraordinary complication there was a law of symmetry and uniformity pervading them which took his fancy very much. It would be seen that when the inert gases were being produced there were always six vessels in series; but when the rich gases were being evolved there were only four vessels in series, and that held good all the way through. Again, the time during which the inert gases escaped was about half the time of that during which the rich gases evolved. There were necessarily some variations, but on the average the inert gas escaped for about one hour to one hour and twenty minutes, and the rich gases for from two hours to three and a half hours. He was also struck by the entire absence of smell of sulphuretted hydrogen, for there was nothing whatever to give any idea of that particular manufacture which was being carried on. He felt that the alkali trade had never adequately acknowledged the great services which Mr. Chance rendered some years ago by threatening the producers of pyrites, who had a combination—which at one time he had even ventured to call a conspiracy—against alkali makers to keep up the prices. At one time Mr. Chance did a great service in the trade for which he received no return, but for the far greater service he had now rendered he believed he would get a substantial acknowledgment.

Mr. ALFRED E. FLETCHER (Inspector of Alkali Works) desired to congratulate Mr. Chance on the admirable manner in which he had developed this process, and on the lucid and clear manner in which he had explained it. It was only another illustration of the thoroughness of everything which Mr. Chance undertook. It was particularly interesting to see why Mr. Chance had succeeded where others had failed, and how he had followed the steps originated by Mr. Gossage, whose experiments had never been forgotten, and yet had succeeded where he had failed. It seemed to him that the three principal points to be noted were these: first in reducing the tank waste to the consistency of cream by mixing it with water, whereas Mr. Gossage used the material dry; secondly, that he did not simply force the carbonic acid through the mixture, but by watching the result had found a means of separating the poor gas from the rich. The sulphuretted hydrogen did not come off in a constant stream; the first portions were absorbed, and after an interval it came off sufficiently pure to be of use. He had also introduced a third point of importance in employing a gasholder, which had nothing to do with the production of sulphuretted hydrogen, but was most essential in utilising it afterwards. It had been suggested that the apparatus looked complicated, but it was most simple in working, and they had been told that the gases were watched until the appropriate richness was obtained, those who had not seen it would probably like to know how it was done. There was no elaborate arrangement of burettes and test tubes, but simply a Bunsen burner, on to which the sulphuretted hydrogen was turned. As long as it burnt the man in charge knew there was sufficient sulphuretted hydrogen coming off, and when the light went out he stopped it. In the same way when he wanted to know if it were rich enough he tried to light the burner, and if it would light the gas was rich enough to send into the gasholder. The Claus kiln was not

introduced here for the first time, for they were familiar with it in the manufacture of sulphate of ammonia produced from gas liquor. But there was a curious result often found in its working. It sounded very simple to say that if the right quantity of air were mixed with the gases you would have exactly the right result, namely sulphur and water formed, and if you had too much air you had sulphuric acid formed, and if too little the sulphuretted hydrogen would pass away; but it sometimes happened that both would come away at the same time, both sulphuric acid and sulphuretted hydrogen if the apparatus was not carefully worked. He suggested some time ago that the kiln or burner should be reversed, and that the gas should be brought in at the top, and passed downwards, and he believed that had been adopted in some places. One thing which sometimes caused a failure in the decomposition of the gas was that the kiln was not kept hot enough, but there was a quantity of heat to spare on the other side of the kiln, and if the air were heated as it went into the burner there would be always sufficient heat, and no sulphuretted hydrogen would pass out undecomposed. He should like to know what percentage of sulphur had been caught by the chambers. Mr. Chance told them that 90 per cent. of sulphuric acid was made from the sulphuretted hydrogen employed, but he should like to know the percentage of sulphur obtained in the other process. Instead of this process interfering with the pyrites mines it seemed to him it would interfere with the Sicilian mines, for he believed there were three times as much sulphur produced in Sicily as could be obtained by saving all the sulphur now wasted. As an alkali inspector he should rejoice in the time when there was no more alkali waste to look after. Though he was told sometimes that his vocation would soon be gone as so many improvements were made in the reduction of nuisance, still he thought there would always be something left to look after. They all knew what a nuisance arose from the deposit of alkali waste, there being 1,000 tons a day deposited at Widnes alone, so that it required some care on the part of all concerned that no nuisance should arise.

Mr. GOSSAGE said he must offer to Mr. Chance his grateful thanks for the recognition he had given to his father's discovery in the decomposition of sulphide of calcium by carbonic acid. In 1837, when his father's discovery was made the decomposition had not been recognised by chemists; it was evolved in his laboratory at Stoke Prior, in Worcestershire, and as Mr. Chance had said the credit of the recovery of sulphur from alkali waste belonged to the same county in which the original idea was evolved. He might mention that a French savant who was in his father's company at the time when he made this elucidation, pretended to be ill and rushed back to France to patent the process; but his father, as many knew, was a man of great energy, and though it was before the time of railways he put his coachman on horseback, sent him with the necessary papers to Birmingham, and they were forwarded to Paris, and arrived there before the Frenchman was able to take advantage of his knowledge. That his father devoted much time and attention and money to the attempt to recover sulphur from alkali waste was known to every one. Where he failed was, as he had pointed out to Mr. Chance before, that he made the mistake of passing impure carbonic acid gases through his waste comparatively dry. By that means channels were formed and decomposition in the ordinary vats was not effected; the cost of carbonic acid at that time before the invention of solid caustic soda, which was also due to his father, was very great because it was not used to any extent, the limestone having been substituted for caustic lime in alkali works. The next cause of failure was the comparatively weak sulphide of hydrogen. There was no known method of obtaining from it either by burning in chambers or by any other process a deposition of sulphur. One process which had been tried many times was the decomposition of weak sulphide of hydrogen by sulphurous acid, but the best results ever obtained by that process were 50 per cent. of sulphur, the rest being unavailable as thionic or tetrathionic acid. He felt very thankful that Mr. Chance had brought this process to a successful issue. Hydro sulphuration had been mentioned before, and perhaps was not absolutely new, but all alkali makers should acknowledge that it had now been practically applied by Mr. Chance for the first time. He had only one word more to say to Mr. Chance, and that was when the sulphide of sodium was practically made there would be no more alkali waste; soda would be made from sulphide of sodium, and the sulphur would be recovered without the *bête noir*, the alkali waste.

Mr. BROCK said he had examined this process several times as he had formerly examined Mr. Chance's magnesium process. In 1883, at the Society of Arts, he ventured to say he believed sulphur could be recovered from alkali waste by that process at a cost of 3d. per unit, and that if the Pyrites Companies would reduce their cost it would be valueless. Strangely enough it fell to his lot to be selected by a considerable body of alkaline makers to open negotiations with one of the large Pyrites Companies, the Tharsis, and to use Mr. Chance's process as a lever to induce them to reduce their price to 3d. After spending two or three days in negotiations he was joined by some three or four other alkaline makers, and the result was that the Tharsis Company did reduce their price, and that was the death blow to Mr. Chance's former process. He did not very much regret it on Mr. Chance's account, for if the price of pyrites had not been reduced, it was more than likely that Mr. Chance would have been satisfied with that process, but as it was no longer commercially successful he turned his attention in another direction, with the result that he had now succeeded in decomposing alkali waste profitably, and obtaining the sulphur either as brimstone, flowers of sulphur, or as sulphuric acid. He had not mentioned the cost, but he thought he might venture to predict that the cost would not greatly exceed 1d. per unit, so that there was a very large margin for those who chose to adopt the process. He had shown his faith in it by taking a licence for the Company he represented, and had already ordered some of the most important portions of the plant, which was calculated to treat 700 tons of waste per week. They intended to push on as quickly as they could, so that they might be in the market while brother manufacturers were considering it. This was eminently a case in which those who began early were likely to win. There was a very large margin of profit. The first thing would be to kill off those manufacturers who unfortunately had the Mond process of recovering sulphur, if they were not already being killed off by the increased price of hydrochloric acid. For with that process it took somewhere about five tons of acid to make one ton of brimstone, and as hydrochloric acid had gone up to about 12s. a ton, he could not see much profit in that. When those gentlemen were killed off they would attack Sicily, and it seemed to him that if the whole trade took up the process there was plenty of room. He felt convinced that Mr. Chance had solved the problem of recovering sulphur from alkali waste at a profit, and the thanks of the trade were eminently due to him. His former efforts were not acknowledged in the way they ought to have been, but he hoped there would be such a rush for licenses that any feeling Mr. Chance might have had that his efforts were not acknowledged would be removed.

Mr. ALLHUSEN said he had seen the process in operation, but had very little to add to Mr. Brock's observations, except that his company decided to follow in his steps, and immediately on his return to Newcastle would design a plant to treat 1,000 tons of waste per week. They would begin with erecting a section capable of dealing with 200 tons of saltcake immediately.

Mr. DAVID HOWARD, though not an alkali maker, desired to express his thanks to Mr. Chance for the exceedingly interesting history he had given of the process. They could no longer say there was no poetry and no chivalry in science. Surely the record of these historic efforts after the recovery of alkali waste were at least as interesting as Sir Thomas Mallory's "Morte d'Arthur." Knight after knight had ridden off in quest of the processes required to fulfil the result; some had gone down, but their work had not been lost, and that was a lesson to every chemist, that, as their great master, Faraday, once said, unsuccessful work ought to be as valuable as success. He did not think the unsuccessful work of which they had heard, the efforts of men like the late Mr. Gossage and others had been lost, because they were now bearing fruit. One after another had tried, and now that the quest had been successful and the goal was won, they might indeed congratulate Mr. Chance on giving them all an example of the true method of science, and he would say once more, as he never missed the opportunity of saying, that there were two things required for such success, high chemistry and good engineering.

Dr. HEWITT said he had come a considerable distance to hear Mr. Chance's paper, and could not express too highly his own sense of Mr. Chance's courtesy and unselfishness in making known all the information he possessed. It had given him the greatest pleasure to listen to the admirable paper he had read to-night. His own feeling was, from an intimate knowledge of the process described, that Mr. Chance was correct in saying that there was no difficulty

whatever in carrying it out. He did not quite agree with him that it could be done for less than nothing, and probably Mr. Brock's estimate of the cost would not be found far wrong. That a nuisance should be diminished and waste prevented was an object which commended itself to all, whether in competition with one another or not, and he had no doubt that he might express for all those for whom he acted their satisfaction that Mr. Chance had succeeded in making the process by the Leblanc soda makers one step more perfect. He did not think, however, that research had ended in the Leblanc process. Dr. Hurter had clearly put before the society at Liverpool the possibilities there were for it in the future, which, perhaps, none could anticipate. A process which had been wasting all the sulphur and something like 80 per cent. of chlorine, must have a future before it, and on studying the figures given by Mr. Chance it would be seen that the process so far from expiring had got into a very assured position. Those figures would enable everyone to see that the process so far from dying was living and thriving, and he hoped the time would come when the taunt they threw out to the Pyrites Company some years ago of establishing a monopoly for keeping up the price of sulphur compounds, might be removed from the Leblanc people, who had made a similar combination to keep up the price of chlorine products. If these people looked into the question of making more chlorine from their salt, they would make their soda all the cheaper, and it was very encouraging to those in a different industry and to himself, because he knew the Leblanc trade, to see that there was little left for the perseverance, determination, and research of such men as Mr. Chance a large field for improvement. He had not the slightest doubt that before they were 20 years older, instead of 80 per cent. of chlorine being wasted, a large proportion of it would be saved. He concluded from the figures that while they had decreased their decomposition of salt very considerably, they had enormously increased their production of chlorine products, which indicated also that their attention had been directed, although not, perhaps, sufficiently, to adopting a process which would not waste so much chlorine. When they remembered that they were promised by Mr. Deacon a decomposition of something like 95 per cent. of the hydrochloric acid given off, it looked as if the process still had in it elements which would enable those in the Leblanc trade to diminish the enormous loss they must now have. The same determination, perseverance, and skill in chemistry and engineering which had brought success to Mr. Chance would bring similar success to them in the future.

Dr. ALDER WRIGHT asked if Mr. Chance would give some details as to the combustion of the sulphuretted hydrogen for the manufacture of vitriol. He could not quite gather whether it was burnt in the modified form of the Claus kiln with the aid of peroxide of iron.

Mr. CHANCE said it was simply lit with a match, and burnt the air going with it up a Glover's tower. There was no Claus kiln required.

Dr. ALDER WRIGHT also asked why it was that the same amount of chamber space was required for manufacturing vitriol in this way as was required in the case of pyrites. One would have imagined, that notwithstanding a certain amount of nitrogen was mixed with the sulphuretted hydrogen, the chamber space would be rather less.

Mr. CHANCE said there were from 65 to 70 per cent. of diluent gases going in the whole time. If Dr. Wright would kindly study the chart at the end of his papers the whole of his questions will be found to be answered.

Mr. F. S. NEWALL said that although he had not had the opportunity of seeing this process at work, he had been steadily at work for the last four years trying to recover sulphur from sulphuretted hydrogen. In 1884, shortly after Mr. Chance's paper at Liverpool, he adopted the Shaffner and Helbig process, and worked it on a fairly large scale, decomposing 90 tons of waste per week for two years, but he found that although they burned some 2½ million cubic feet of sulphuretted hydrogen, they had great difficulty in reducing the consumption of nitre; in fact, it increased instead of decreasing, and they therefore determined to give up the process and try if they could not recover the sulphur as sulphur. After a number of trials they finally adopted a kiln which was precisely similar to that used by Mr. Chance, and they had been working in the same line ever since. It dated back as far as 1842, when Mr. Gossage took out his original patent for decomposing tank waste by carbonic acid; but they adopted the plan suggested by Mr. Fletcher, of letting the sulphuretted hydrogen come in at the top and the sulphur run out at the bottom. That kiln had bee some time, and they had recovered between 200 tons of sulphur from it in the same form as was the table, but they had not been able to recover sulphur in the dry state. The large quantity acids formed, and the fairly large quantity of li phurous acid, caused the waste to a certain ext sulphide, but on the whole they recovered abou cent. of the total sulphur in the waste, after takir screenings and large cinders. He thought Mr. process had every element of success in it, and n gratulate him on having so well grappled with the attendant on dealing with such a noxious gas as sul hydrogen.

Mr. CHANCE was then called upon to reply. drew attention to a very fine enlarged photographi of the late Mr. Weldon, and said he had spent son trying to get up a little enthusiasm amongst trade for the purpose of perpetuating the memor gentleman by a portrait, for which he sat to M Udle, and hoped still that something would co With regard to the apparatus used in this process, to make one statement most emphatically, in letter he had received from one of the most emine facturing firms in England. They asked if they reserve him any commission on the apparatus they and he had only to say that his firm would have do with commission in any shape or form. They royalty, which they expected would be loyally they wanted every one to get the best possible app the cheapest terms, and anyone who offered any co would have no dealings with them. He might men Messrs. Galloway, Newhall of St. Helens, Dal others were already prepared to supply apparatus who might require it. With regard to the numbe which Sir F. Abel had referred to, he might say th Brunner, Mond and Co. had at least 100 pipes for he employed, and they were eminently successful i ing the escape of ammonia, which they would be to lose. No one need hesitate to embark in the that account. Another point in common with Messrs. Brunner was, that they both looked on with very great respect, and at some future time perhaps read a paper on the history of the lime what it had done for the alkali trade. What Mr. said showed that if the Shaffner and Helbig proce been very successful, it had been of some advant alkali trade in inducing the Tharsis Company to price of pyrites. It was quite true that his su connected with the three points which Mr. Fle alluded to, though possibly they might lay more one point than another. With regard to the escap from the Claus kiln, he must respectfully decline Mr. Fletcher's question, as they were not bound nate themselves. Mr. Fletcher and his very able access to the works, and it was their duty to ascer gases were escaping; it was not for him to tell must thank Mr. Gossage very warmly for the way in which he had referred to his small recognit late Mr. Gossage's efforts. They must all appr seed sown by Mr. Gossage; to a certain extent it in the Shaffner and Helbig process, and now it Mr. Brock had ventured to prophecy without kno no doubt he would be about right, but so many woul ing into this in a short time that probably prices even less than he had mentioned in consequence provements which would be introduced. He had that any acknowledgement was due to him for efforts; it was a speculation in which they investe and if it had succeeded they would have made year, which they would not have asked other share with them. He was delighted to hear Allhusen intended applying for a license, and shou it to him immediately. Dr. Hewitt, Mr. Mond's usual, had spoken in the kindest possible way of and he only regretted that Mr. Mond was not able sent himself, but he was fortunately enjoying the of Italy. He had not stated that the process could on for less than nothing, but that the labour cos nothing, and if they spent £20 a week in wheeli and now it only cost £15 for the whole process, his statement was justified. In his estimate he h value whatever on the carbonate of lime, which sent moment might be a source of expense, as it so much weight to be dealt with, but there w

distinguished cement makers present, and he might tell them that before long it was probable that the cement trade would come partly, at any rate, into hands that had not yet been deriving profits from it. When they reaped the benefits of science in the direction of cement making, the sulphur recovery process would be worked for less than nothing, and it was probable that before long a patent would be taken out in connection with cement making. With regard to what Dr. Hewitt said about the enhanced value of hydrochloric acid, he could only say that he thought there was nothing like buying in the cheapest and selling in the dearest market if you wanted to make money. Mr. F. S. Newhall had put himself in a most dangerous position, and he admired his courage in confessing that since 1884 he had been working the Shaffner and Helbig process, for he had never received any royalty from him, and he thought he should immediately instruct his solicitor to take proceedings.

Mr. NEWALL said he held receipts for some of the royalties.

Mr. CHANCE said he hoped Mr. Claus also would instruct his solicitor to take preceedings, as Mr. Newall said he had been working a kiln of precisely similar construction.

The PRESIDENT in proposing a hearty vote of thanks to Mr. Chance, said he should fail in his duty if he did not draw from the elaboration of this process on the one hand, and the description on the other, some inferences which bore not only on the progress of science in general, but on the position of applied chemistry at the present time in England. There was a great deal of discussion going on in regard to what was called Technical Education, and what course the Government should take in regard to its encouragement. He had been recently asked, as president of the society, at a time when he could not consult the feelings of the council with regard to any course or action he might adopt, to take part in a deputation to the Privy Council on the subject of Government grants for applied science, and he would therefore try to draw a moral from this paper of Mr. Chance's. There were some extraordinary coincidences with regard to the results of Mr. Chance's labours. Taking the alkali trade alone, and considering what was taking place as a revolution within a very recent period, taking the ammonia-soda process, the Weldon-Pechiney chlorine process, the late Mr. Weldon's own chlorine process, and Mr. Chance's sulphur recovery process. Mr. Chance confessed that he was not the discoverer of the chemical reaction involved in the success of this process. It was Mr. Gossage to whom the credit of discovering it was due. When he had lately occasion to bring the Weldon-Pechiney chlorine process before them he told them regarding that simple decomposition of chloride of magnesium with oxygen, that he had failed to find any reference to it in modern text books, but when he went back to Graham, he found that he was well acquainted with the reaction of air on chloride of magnesium giving chlorine. Coming to the ammonia-soda process, did those who were now successfully carrying on the manufacture discover the reaction involved? No; the discoverer was a man who did not derive any benefit from it. There were three discoveries which did not bear fruit for a long time; the essential chemical operations had simply to be defined and elaborated. He would ask them to consider these results and to say whether it was due to specialised labour, or that which had come to be currently regarded as technical science; whether an individual instructed in the limited field of knowledge bearing on his own manufacture would have elaborated any of these successful processes? To his mind it was clear; if you wanted to succeed in the larger, or in what Mr. Howard called the higher chemistry, long and careful study was required, but here the higher chemistry had discovered these reactions, and they had a long time to wait for their application. Was it the specific knowledge, or was it not rather the larger general knowledge which was required? Was it not the higher scientific education, apart from the question of results, which they should seek to be generally disseminated throughout the country, and available for every man or woman anywhere? It seemed to him that if you taught technical chemistry in a rigid defined way, the probability was that instead of going forward they would go backwards. It was the larger general cultivation of science, and the proper and intellectual mode of teaching it, apart from any question of results, which was deficient; and he trusted that in the future this would be not only appreciated by the country, but supported by the government. A most remarkable lesson was to be drawn from this discovery. The same agent, carbonic acid, not only produced a useful result, but enabled them to get quit of a nuisance. The problem was how to get rid of an inert gas, and how to economise the resulting product, and it seemed to him that if they were not to the front in the higher chemistry, they were at least to the front in the acumen, which was commonly called nous. He therefore congratulated Mr. Chance and England at least on this, that with regard to the ancient manufactures which had been established in their midst, they were not behindhand in the latest application of modern science. He agreed with Mr. Howard that we were behind in the novel applications of the highest chemistry, and that deficiency must be met, but it must not be met by attempting to confine intelligence merely to one department, but by that higher cultivation which had now been developed into another word which meant chemical engineering. What did a chemical engineer mean? A man who, apart from knowing this specific reaction, had such a wide intelligence that he not only had the artistic art, but had at the same time that knowledge that he fearlessly embarked his capital in the most complicated pieces of apparatus in order to achieve the desired result. It always appeared to him very marvellous when he heard a man like Mr. Chance come forward and say that he had spent £15,000 in elaborating a manufacture that was practically a failure as far as his own returns were concerned. It was not a failure as far as the country was concerned, but it was to his own pocket; and how dreadfully mean they looked as a nation when compared with the Germans. He had found during the whole course of his life when entering on any scientific investigation, he had always to consider how it was to be paid for; but how could science be cultivated unless they had in their midst, in the centres of education, some means of at least providing the material to elaborate those scientific results and facts upon which the future applications of chemistry depended? It was no use building new laboratories unless there was an opportunity of making use of them. As he had said to some learned and reverend dons in a town with which he was connected, it was no use having a laboratory unless he had a thousand pounds to throw down the sink. They said they wanted to see something in return, but he told them they could not expect to see any results in a chemical laboratory at once, and unless he had the thousand pounds to throw down the sink they would never see anything. He congratulated Mr. Chance on what he had achieved as the result of his indomitable perseverance and enterprise, though indirectly it was due to the discoveries of pure science.

The vote of thanks having been carried unanimously,

Mr. CHANCE briefly responded, and after stating that he desired to give a share of the credit to his cousin, Mr. Fredk. Chance, as well as other members of the firm, said there was one remark by Mr. Gossage which he had omitted to refer to. He had intimated that when sulphide of sodium was manufactured on a large scale soda waste would cease to exist, and then this process would cease to be a *raison d'être*. He would simply say that the question of sulphide of sodium was now receiving his attention, and they might hear something of it on some future occasion. If it did come to the front, the major part of this process would still be available, and therefore no one need be deterred by Mr. Gossage's final reference to the unknown future from taking advantage of the opportunity of going in for Sicilian brimstone and pure sulphuric acid in competition with other sources of supply.

## POLLUTION OF LOCH GOIL AND LOCH LONG.

REPORT OF THE GOVERNMENT INSPECTOR.

THE report of Mr. Alfred E. Fletcher, H.M. Inspector under the Rivers Pollution Prevention Act, who was appointed by the Secretary for Scotland to make an examination of the waters of Loch Goil and Loch Long in reference to their alleged pollution, has been presented to Parliament. On proceeding to the immediate neighbourhood of the alleged nuisance, Mr. Fletcher found that very many of those who resided on the coast complained of the growing impurity of the water. A feature noticed by all was the scum floating on the surface, especially discernible in calm weather. Those who were accustomed to bathe in the water complained very much of this, as did also the fishermen, these latter alleging that their lines were made foul, covered with a slimy substance, and that fish had become scarcer of late years. The following were believed by the residents to be the principal sources of pollution to which these lochs are exposed:—

1. The dredgings of Glasgow Harbour and the Clyde, containing a portion of sewage matter which has settled in the bed of the river. These are brought in barges and deposited at the entrance to or southern end of Loch Long. The quantity so brought is one and a quarter million tons per annum. There were also the dredgings from Greenock Harbour.

2. The deposit of about 150 tons a week of tank waste brought from an alkali works and discharged at the southern end of Loch Long.

3. The water of the river Clyde bringing down the sewage of Glasgow.

4. The drainage from the villages and country houses on the shores of the loch.

5. The soot settling from the smoke of numerous steamboats plying on the Clyde and on the lochs in question.

6. Cinders and other refuse thrown out from the steamboats referred to.

It was contended by some that these sources of pollution, though extensive, were not sufficiently serious to affect the large volume of water daily entering the loch. They believed that if it were not for the barges bringing the objectionable matter for deposit in the loch no pollution of the water would be noticed. In pursuing, therefore, the inquiry, it seemed to Mr. Fletcher necessary to determine—(1) Whether the pollution was such as to justify the complaint made; (2) What were the sources of such pollution; (3) What remedies could be suggested for removing them. It could not be said that the pollution was such as to appeal strongly to the eye. The water did not appear wanting in brightness. Occasionally it was said the water looked dirty, but this was not the case in Mr. Fletcher's experience. He therefore collected specimens of the water, placing them in well-stoppered bottles, and brought them away for analysis. These were taken not only from the neighbourhood of where the Clyde dredgings were deposited, but at intervals of a few miles throughout the extent of the lochs, and also from some of the neighbouring lochs, so as to afford opportunity for comparison. The specimens were taken at low water. The water of the lochs is deep, reaching to 30 and 40 fathoms in the middle. The bottom is usually covered with a soft mud, the result of a slow deposition from the water. Believing that an examination of this would indicate the locality and nature of the source of the impurity, he collected specimens over an extended area, reaching at intervals throughout the whole length of Lochs Long and Goil. Some also were taken from neighbouring lochs and a portion from the river Clyde. He did not fail also to collect portions of the scum which in calm weather floats on the surface of the water. Of these there were two kinds, one being composed chiefly of soot which had fallen from the smoke of steamboats; the other was brown in colour, and was seen as a thin film when the water was still. The deposits of soot might be observed on the Firth of Clyde far below the entrance to Loch Long lying in patches in calm weather as far south as Rothesay. This soot, drifting by help of the tide and wind, was seen at the southern portion of Loch Long. Further up the Lochs Long and Goil, and even at the head of either loch, might be found a scum, brown in colour, which, when kept for a short time in a closed vessel becomes highly offensive, and consists, doubtless, of sewage matter—a suspicion which was confirmed by the analysis.

Commencing with the water of Glasgow Harbour, the analysis showed clearly the presence of sewage contamination, and this was indicated in a lesser degree in the Clyde water as it passes Greenock, Gourock, and the Cloch Point. The same was shown by examination of the mud taken from the same places. The waters of Lochs Long and Goil and Holy Loch show no such marked indications of pollution, but they are inferior to those of Lochs Striven and Ridden. For more than twenty years it has been the custom to make the entrance to Loch Long the place of deposit for the mud which is dredged up from Glasgow Harbour and from the bed of the river Clyde. As much as 1¼ million tons of this material are annually brought here. It might have been expected that the material found in the bottom of the loch at intervals throughout its length would have shown the presence of this mud, diminishing in amount as the distance from the place of deposit increased. An examination of the analysis did not, however, show this to be the case. There was evidence of sewage mud at the place of deposit, but no gradual diminution in the percentage of nitrogen in proportion as the distance from the place of deposit is increased. Probably when a discharge of sewage mud is made in the loch at the time of flood tide the finer particles, floating long in the water, are carried up the loch for a considerable distance. During the transit they become oxidised and innocuous. It is possibly during this process that a portion of the material in process of decomposition rises to the surface to assist in forming the scum so much complained of. The soft, slimy deposits are the most nitrogenous, and occur in the still, deep places, increasing towards the head of the lochs when the tidal currents are feeble. On banks or in places where a swifter current has left deposit more sandy the soft nitrogenous matter is removed. The amount of this does not therefore depend on the nearness to the place of deposit of the dredgings at the entrance to the Loch Long, but rather on the stillness of the water. Also, in Loch Striven the mud taken from the head is more nitrogenous than that taken from the entrance to the loch, and, with the exception of one specimen, is as nitrogenous as that found at the heads of Lochs Goil and Long. An examination of the sheets of water analysis shows the water of Loch Long to be slightly inferior to that of Loch Goil, while both are superior to that of the Holy Loch, but inferior to that of Lochs Striven and Ridden. An analysis is given of the scum found in still, warm weather on the water of Lochs Long and Goil more or less throughout their whole length, and at the head of the lochs. After being kept a few days the material became highly offensive, and was evidently largely composed of sewage matter. A quantity was collected at the head of Loch Goil at a distance of twelve miles from the entrance to Loch Long, where the dredgings, etc., are discharged.

It cannot be doubted, Mr. Fletcher says, from the evidence that the complaints raised as to the pollution of the water of Lochs Long and Goil are well founded. Also, it may be said, that the pollution is occasioned by one or more of the six sources already set forth. All of them are at work and contribute to the evils. Most of them may be removed. Taking the sources of pollution in order, Mr. Fletcher goes on to say:—

1. The dredgings from Glasgow Harbour and other places which are deposited in Loch Long to the amount of one and a quarter million tons a year, also those from Greenock.—The principal argument in favour of the practice is its convenience. Many, however, believe that places of deposit might be found on the banks of the Clyde, where those dredgings would make good land instead of, as at present, spoiling good water. The amount, if placed with an average thickness of 9 feet on the land, so as to raise it above high-water mark, would cover 1,000 acres every year. There appears to be many portions of the foreshores where this treatment would be suitable, and where the land so covered would be of considerable value.

2. The deposit of tank waste from an alkali works.—The action of this has certainly been injurious to the water. This material, though not soluble in water *per se* becomes so on absorption of oxygen, yielding a sulphurous liquid poisonous to fish. Experiments show that the solution of material goes on more rapidly in sea water than in fresh. Mr. Fletcher says he has taken it on him to represent to the directors of the North British Chemical Company the evil caused by their deposit of the "waste" here, and has already received an assurance that it shall cease not later than the beginning of the present month.

3. The influx of impure water from the Clyde at the mouth of Loch Long.—This must obviously be a source of pollution as long as the sewage of Glasgow flows down the Clyde. If, as is asserted by some, the direct outward flow of the river Clyde is confined to the Greenock shore, yet on the return tide some of the impure water will certainly be brought back.

4. The drainage from villages and houses on the shores of the lochs.—It seems to Mr. Fletcher most probable that the scum found floating on the water is partly of local origin. It is not offensive when gathered, but becomes highly so when kept. It is found on all the lochs which Mr. Fletcher examined, but mostly where there were houses. Trace of it were found on Loch Striven. As a remedy for this it is suggested that, as far as possible, by the use of earth closets and catch pits, all house drainage should be kept out of the lochs.

5. The soot caused by the numerous steamboats plying on the lochs and on the Clyde falls on the water, and in calm weather collects in patches. It may be observed floating with the tide and drifting into the lochs. The whole of this, and the black smoke sent forth from the steamboats' funnels, is curable, and that without loss to those who now carelessly produce it. Pressure, he says, is needed to compel the constructors of the boilers and those who use them, to cause the nuisance to cease. At present the practice is not forbidden, except when the vessel is alongside a pier or wharf.

6. Refuse thrown out by passing steamboats.—This doubt-

less contributes to the general result. It must be small, however, compared with other sources of nuisance.

These, Mr. Fletcher believes, to be the causes of the pollution of the waters referred to, and the remedies, as far as he is able to point them out. The sources of pollution are many. If all of them cannot be at once removed this, he says, should not be pleaded as a ground for inaction. The principal one—that of making Loch Long a receptacle for the refuse of Glasgow and neighbourhood may be pointed out as a gross evil, which should now be stopped. Although for many years a vast amount of material has been thrown into the loch, the soundings are not materially altered at the place of deposit, showing that the mud, etc., has been carried away by the tide far up into the loch, thus largely increasing the area of pollution.

# Trade Notes.

Sheffield Gas Company.—Mr. John Thomas Key, who has been with the Sheffield Gas Company for the past eight years, has left their employment.

Andersonian Chemical Society.—At the last weekly meeting of this society Mr. Archibald Kling delivered a lecture on "The Polariscope and its use in Chemistry." He first explained the phenomena of polarisation and the laws governing them. Proceeding, he explained the construction of a large number of polariscopes, including Wild's, Soleil-Ventzke's, and Miterscherlich's, and some of the later improvements on these instruments. He next took up the use of the polariscope in qualitative and quantitative chemical and physiological analysis, illustrating the various applications by practical examples. In concluding, the lecturer referred to the various hypotheses brought forward to explain the phenomena of polarisation, dwelling at considerable length on the theories of Le Bel and Van Hoff with regard to the connection between isomerism and optical activity. The lecture was listened to by a large audience, and illustrated by numerous experiments and diagrams.

Emmensite.—This is the latest addition to the already long list of explosives, being the invention of Dr. Emmens, of New York, is announced to have for its principle constituent a new nitric product prepared from certain hydrocarbons of the aromatic group. If we may credit the reports, Emmensite will be of service also to the pyrotechnist. For purposes of signalling and fireworks there has long been sought after the means of producing coloured fire without smoke. Emmensite is said to have this virtue.

Precious Stones out of Common Ones.—They knew a thing or two even in the unsophisticated days of old. They knew, for example, how to make, for all the purposes of commerce and wear, morsels of cut glass into yellow diamonds, emeralds, carbuncles, hyacinths, and other precious stones. A treatise, bearing the date of the 13th century, and designed to show the Greek alchemists of that epoch how to do the thing, has just been discovered by M. Berthelot, and submitted to the Paris Academy of Sciences.

An Overdose of the Remedy.—Soda, like the small beer of our forefathers, is looked upon as possessing virtues in the matter of dissipating the bewildering fumes of alcohol. But it is possible to make the cure worse than the complaint. This was certainly done by the unfortunate fellow who, in his cups, hied him to a soda vat on the premises of Messrs. Tennant and Co.'s Chemical Works, and fell into it neck and crop. Luckily for him, he was rescued, and, as luckily, the magistrates of the Hebburn police-court—whither he was taken in a miserable plight—took a lenient view of the case. The lesson he has received should teach him to eschew the contents of vats, whether they be strong liquors or other chemicals.

## AVERAGE PRICES OF SULPHATE OF AMMONIA DURING THE LAST DECADE.

| | 1878. | 1879. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| January | 20 10 0 | 17 17 6 | 19 15 0 | 19 17 0 | 20 17 6 | 18 15 0 | 14 0 6 | 12 12 9 | 10 14 6 | 11 12 0 |
| February | 21 0 0 | 18 2 6 | 19 5 0 | 20 5 0 | 21 2 6 | 18 3 9 | 14 5 0 | 12 1 3 | 11 5 0 | 11 14 6 |
| March | 21 5 0 | 18 7 6 | 18 12 6 | 20 0 0 | 21 6 3 | 18 8 0 | 14 11 6 | 11 18 3 | 12 11 11 | 12 3 9 |
| April | 20 10 0 | 17 15 0 | 18 10 0 | 19 15 0 | 20 10 0 | 17 3 9 | 14 10 6 | 11 15 4 | 12 5 0 | 11 5 3 |
| May | 20 7 6 | 17 15 0 | 17 13 0 | 19 11 3 | 20 4 3 | 16 18 3 | 14 7 6 | 11 3 6 | 10 17 0 | 11 13 3 |
| June | 21 0 0 | 17 5 0 | 18 15 0 | 20 5 0 | 20 10 6 | 17 5 6 | 14 13 9 | 11 18 3 | 11 0 7 | 12 3 9 |
| July | 20 15 0 | 18 0 0 | 19 5 0 | 20 6 3 | 20 15 0 | 16 5 0 | 14 19 6 | 11 14 3 | 11 3 6 | 12 12 6 |
| August | 20 10 0 | 18 15 0 | 19 5 0 | 20 10 0 | 20 11 3 | 16 7 0 | 15 8 6 | 11 16 6 | 11 5 7½ | 12 12 0 |
| September | 20 10 0 | 18 10 0 | 18 15 0 | 20 7 6 | 20 9 6 | 16 10 0 | 15 6 3 | 11 2 6 | 10 18 5 | 11 17 0 |
| October | 19 2 6 | 19 0 0 | 19 0 0 | 20 10 0 | 20 1 3 | 15 5 8 | 14 12 6 | 10 12 6 | 10 13 9 | 11 9 0 |
| November | 18 10 0 | 19 15 0 | 19 5 0 | 20 11 3 | 19 6 9 | 13 17 0 | 13 12 0 | 10 8 9 | 10 12 0 | 11 9 9 |
| December | 18 12 6 | 20 0 0 | 19 10 0 | 20 15 0 | 19 7 6 | 13 13 0 | 13 3 1½ | 10 5 9 | 10 15 7½ | 11 19 6 |

The Merchandise Marks Act.—One of the greatest injustices which the new English Merchandise Marks Act—or rather the absurd interpretation of its provisions by the English excisemen—has entailed upon German manufacturers is the rigorous examination, and occasional confiscation of transit goods, which are not for one moment intended to remain in England. It has lately been ascertained that the English Customs officials assert their right to examine and confiscate not only goods which are addressed to the docks for discharge on to another vessel, and are even provided with through bills of lading, but also goods which are brought from one ship into another by Thames lighters. Only those transit goods remain free of examination which form part of the cargo of vessels which do not discharge in England, but only complete their lading at English ports. Under these circumstances, German shippers should now stretch every nerve to enable German exported goods to avoid transit through English ports. New steamship lines must be established, and the minimum freightages to oversea countries still further reduced. Even for ports so valuable to German export as those of Calcutta and Bombay there is at present no direct steamship line. It must be the affair of German energy and enterprise to seize the present golden opportunity, and employ it to the best possible advantage for the advancement and extension of German trade and industry.—*Kuhlow's German Trade Review.*

Loch Katrine Water.—The monthly report of the quality of Loch Katrine water, prepared by Professor E. J. Mills, D.Sc., F.R.S., Glasgow and West of Scotland Technical College, has been issued. The results are returned in parts per 100,000:—Total solid impurity, 2·70; organic carbon, ·153; organic nitrogen, ·028; nitric nitrogen, ·005; ammonia, ·000; total combined nitrogen, ·033; hardness, 1·11; chlorine, ·70. Temperature, 4·0 degrees C.=39·20 degrees Fahr. The water was sampled on Feb. 16. It was light brown in colour, and contained a little suspended matter.

Does Baryta Injure Cloth?—Consul Gregory, of Ichang, writes to the Marquis of Salisbury, on his report of the trade of that Chinese port, that cotton goods there felt the effect of rumours amongst the Chinese that disorders of the skin had been induced by the use of foreign cotton stuffs. He suggests that it would be well if those interested in the cotton goods trade would "take means against the presence of noxious or irritant matter" in the articles; and he hints that "the alleged use of baryta" and its effects are worth consideration. To this locality, the latter hint is worth being acted upon.

Bolton Water Supply.—The Bolton Corporation reservoirs now only contain 30,000,000 gallons of water, equal to 64 days' supply, the lowest quantity at this period for many years past. The public are requested to use the water most sparingly, with a view of avoiding a famine.

The Welsh Gold Mines.—The Clogau Gold Mines Limited, is the title of a company registered on the 1st instant, with a capital of £50,000, in £1 shares, to acquire gold, silver, lead, and other mines and properties in England or Wales, and in particular certain mines in the county of Merioneth, part of which is held under a lease from Her Majesty. The purchase is subject to an unregistered agreement between Messrs. T. E. Vickers, Douglas Vickers, W. J. Cundell, William Pritchard Morgan and John Reid, of the first part, Hamilton Smith, jun., of the second part, and Archibald McKinlay (for the company) of the third part. The subscribers are:—G. E. Renwick, 61, Cavendish-road, Brondesbury; G. Kennaly, 5, Union Court, clerk; S. Bramall, 14, Angel-court, stockbroker; W. F. Budd, 16, Penge-road, South Norwood; H. A. Redford, 6, Rockhill-terrace, Cricklewood, N.W.; E. Escombe, 26, Austin Friars, stockbroker, and A McKinlay, 5, Union-court, E.C., who take one share each. The number of directors is not to be less than two, nor more than seven; the subscribers are to appoint the first; qualification, £100 in shares; the company in general meeting will determine remuneration, but it is provided that £100 per annum for each director shall be the minimum.

Sunlight Soap.—It is stated that Messrs. Lever Brothers, well known as the manufacturers of the celebrated "Sunlight Soap," have recently purchased an estate of 52 acres at Bromborough, on which they will immediately proceed to build works for carrying on their special branch of business. This will come as good news to the district, as Messrs. Lever will probably employ no fewer than a thousand people when the huge establishment is erected. The manufacture of the soap has hitherto been carried on at Warrington, but the premises there have been found to be too small and circumscribed in consequence of the great increase in the business of the firm, and the Manchester Ship Canal scheme interfering with the works.

Shipping Charges.—A correspondent of the *Newcastle Daily Chronicle* writes to that paper as follows:—We have just had a small steamer in the Tyne discharging iron ore and loading coals outwards. This steamer had only 760 tons of cargo inwards and 710 tons outwards. Her disbursements were as follows:—

| INWARDS. | £ | s. | d. |
|---|---|---|---|
| Pilot | 1 | 14 | 0 |
| Foy Boat | 0 | 10 | 0 |
| Discharging 760 tons ore, at 7½d. | 23 | 15 | 1 |
| Tonnage dues | 5 | 13 | 9 |
| Tyne Dock dues | 11 | 19 | 6 |
| Lifeboat | 6 | 3 | 0 |
| Tyne export dues | 0 | 9 | 6 |
| Trinity lights | 3 | 7 | 4 |
| Shipwrecked Mariners' Society | 0 | 1 | 0 |
| Agency clearing inwards | 2 | 2 | 0 |
| Total inwards | £49 | 15 | 2 |
| OUTWARDS. | | | |
| Low lights | 0 | 2 | 8 |
| S. F. and M. Society | 0 | 1 | 0 |
| Wellesley Training Ship | 0 | 1 | 0 |
| Consulage | 3 | 19 | 3 |
| Pier dues | 3 | 15 | 10 |
| Tonnage dues (again) | 5 | 13 | 9 |
| Tyne Dock dues (again) | 4 | 1 | 10 |
| Northumberland do. | 3 | 15 | 10 |
| River watch | 0 | 9 | 6 |
| Town and ballast dues | 4 | 12 | 2 |
| Trinity lights (again) | 3 | 5 | 11 |
| Agency clearing outwards | 2 | 2 | 0 |
| Consular telegrams | 1 | 15 | 11 |
| Trimming, including bunkers | 8 | 4 | 1 |
| Pilotage (outwards) | 1 | 5 | 6 |
| Foy Boat " | 0 | 10 | 0 |
| Agents, petties, and telegrams | 1 | 9 | 3 |
| Towage from Tyne Dock to Howden Dock | 1 | 8 | 6 |
| | £96 | 8 | 11 |
| Less for town dues | 3 | 18 | 1 |
| Actual cost in the Tyne | £92 | 10 | 10 |

How is it possible for small steamers like this to pay, or even make ends meet, when such a large sum is required in the Tyne? I may mention this steamer was only five days in port. It seems to me too bad to be compelled to pay the full dues both in and out.

# Queries and Replies.

Sapolein.—Can any of your readers tell me anything about this article, which is used in Scotland in wool spinning, jute spinning, etc., or the name of any mill using it?—F. H.

Portland Cement.—Is an earth of the following composition suitable for the manufacture of Portland cement, or any specific purpose?—

| | |
|---|---|
| Siliceous insoluble matter | 58·20 |
| Alumina | 2·10 |
| Iron | 4·80 |
| Lime | 11·70 |
| Magnesia | 0·30 |
| Combined water | 7·00 |
| Carbonic acid | 9·28 |
| Sulphur | 1·25 |
| Carbonaceous matter | 3·60 |
| Oxygen and loss | 1·85 |

—W. J. F.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

L. J.—No good would come of a lengthy discussion on the subject now.

J. C. S.—Yes; go in while the door is open, it may be closed some day.

B. B.—Thanks for your "Notes." They are always welcome, lightening as they do the editor's work.

Novice.—Your query shall go in next week's issue.

C. E. L.—Yes, the tar distillers. Your assumption is incorrect.

Beta.—Apply to a patent agent, who will search for and send you all the Blue books relating to the subject.

G. H.—The process is as old as the hills; it is only the apparatus and mode of working that can be patented.

Carbon.—Your joke is very appropriate, but unfortunately it is libellous.

G. & S.—Thanks for your note and pamphlet. We will have use for it shortly.

W. L. E., Phila.—We know the crane and the makers of it. Both may be depended on.

A Subscriber.—Yes, generally; but we are shortly moving to larger and more convenient offices, in the same street, however.

# Legal.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

EXPERT EVIDENCE.—*continued.*

Professor James Dewar, re-examined.

The L in the print ought to be a small l—Mn Cl?—It is intended for manganese combined with chlorine.

That is a way of obtaining the peroxide from a permanganate salt is it not?—That is true.

Is that an operation in which the proceedings used in the production of Weldon mud are followed?—There is no analogy whatever.

Therefore the modes that are described in the claim—I do not mean to say for a moment that they exclude proceedings similar to those in Weldon mud—but do they include a vast variety that are not like it?—I think the claim is exhaustive of every method of making peroxide of manganese that I know of.

Mr. Justice Kekewich: Hydrated or anhydrous?—Both.

Mr. Moulton: And do you adhere to what you said in the examination-in-chief that anhydrous peroxide will not purify these solutions from iron?—I say it is perfectly useless attempting to purify by means of anhydrous peroxide in any manufacturing form whatever. It would never do in the laboratory, and far less would it do on a large scale.

You had told us several times what Weldon mud is?—Yes.

Were there methods of fully oxidising Weldon mud known to the chemists which would end in an anhydrous form?—Very well known.

And there were others which would end in a hydrated form?—Quite so.

Now let me go to the manufacture. Was there any mode in use in the chlorine manufacture, or in any manufacture that you know of, which fully oxidised Weldon mud?—No.

I believe that in the Weldon process you add a large quantity of lime, do you not?—It was the original idea of Mr. Weldon to add a large quantity of lime, in order to get a larger yield of combined peroxide, but it was found to be impracticable.

When you put the ordinary quantity of lime and blow through it—of course, the lime itself is very powerfully alkaline?—It is.

Is the result made powerfully alkaline or what?—The lime is then neutralised by manganese oxidation, and the result is that a large portion of the lime apparently disappears from the solution as far as alkalinity goes. The result is 80 per cent. of peroxide of manganese combined oxide and 20 per cent. of protoxide of manganese combined, along with the excess of lime.

Speaking as a chemist does the disappearance of that show——

Mr. Aston: What does it show?—It shows a combination. It is undoubted; you will find it in every chemical book, you

will find it in Roscoe if you refer to manganites, you will find it everywhere.

Mr. Moulton: Now there has been a reference to Lunge. I think the passage read was this, "While by using a full equivalent of excess of lime in the Weldon process the whole of the Mn $OH_2$," that would be hydrated peroxide?—Yes.

"Or the whole of it within 1 or 2 per cent. can be converted into Mn $O_2$, a full equivalent of excess of lime is never now used in practice. The use of so large an excess would be too apt to give 'stiff batches' and would be no corresponding advantage." Is that what you refer to?—That is what I refer to.

"It would yield a product consisting almost entirely of Ca O Mn $O_2$"—that is the manganite of calcium?—Yes, the manganite of calcium.

Therefore, as far as Lunge's authority goes, he took it to be a combined salt?—No person ever denied it.

"And so containing a full equivalent of combined base." Then he goes on and he describes the result of using rather less, and he says that with ·6 of excess of lime the degree of oxidation obtained is usually about 86 per cent.; the product before the final liquor consisting in Weldon's view of $Mn_2$ $O_3$. Is that the manganite of manganese?—Yes.

Ca Mn O —that is manganite of calcium?—Yes.

And Ca $Mn_2$ $O_5$—those are the two equivalents?—Yes.

Do you agree with those remarks of Lunge?—I do.

You have been asked when Mn $O_2$ is the operative agent in the action. Is the fact that Mn $O_2$ in order to be efficient must be used in combination inconsistent with its being the operative agent. I do not know whether I made myself intelligible. Will Mn $O_2$ excepting in combination in your opinion work?—It must be in combination.

And speaking as a chemist is there anything unusual in the fact that a body must be in combination before it will produce a particular effect?—There is nothing unusual.

There has been a reference to the manganese which would pass into solution. Is it necessary that manganese which passes into solution should be removed, or prevented from passing into solution?—Absolutely necessary in order to get a marketable product.

Would you kindly explain to his Lordship what the manganese as it passes into solution comes from?—It comes from the manganite of manganese. It comes from the 20 per cent. of protoxide which is combined with peroxide in the Weldon mud. That passes into solution and changes. You get that replaced by lime or some other bases—soda or magnesia if you like—and that manganese passes into solution. There is an exchange between the combined lime and the peroxide of manganese, the manganite of calcium and the iron in the solution. One is precipitated and the other passes.

You were referred to Roscoe, and I will read a passage from Roscoe: "The solution of manganese chloride freed from iron and excess of acid by means of carbonate of lime when mixed with milk of lime in 1·6 times the quantity needed for the exact precipitation of the hydro-oxide"—is that a correct description?—That is a correct description.

"The resulting mixture, consisting of manganous hydro-oxide, carbonate of lime, and calcium chloride is heated by a current of steam to 55°, and a rapid current of air is blown through the liquor. As soon as about three-fourths of the manganous oxide has been transformed into dioxide the liquor is allowed to settle, and the clear solution made of calcium chloride drawn off from the deposit of black dioxide combined with lime, technically termed manganese mud." Reading that, in your opinion is Professor Roscoe's view of the constitution of Weldon mud inconsistent with, or different from, yours?—It is perfectly consistent, and he describes further in a separate paragraph, which you will find there, the known manganites—the compound of peroxide—under a separate heading altogether. It is a page or two further on.

Mr. Justice Kekewich: I want you to assist me in understanding better than I do at present Spence's provisional specification: "Our invention consists in producing alum and other salts of alumina with but a very minute proportion of iron and of coloured organic impurity, by digesting or acting upon their solutions with an oxide of manganese." What do you understand by the expression "an oxide of manganese?"—I understand that they had discovered that one of the four oxides would act in this way, but which one I could not say.

That is a question of grammar. You say that there are four oxides of manganese, any one of which may be properly described as an oxide of manganese?—Undoubtedly.

Is there anything in the expression to point a manufacturer or chemist to the peroxide of manganese?—Nothing whatever.

I will not take you through the specification, but at line 23 you will see these words, "To the alum solution this form is added—the oxide of manganese"—of course he is referring to the oxide of manganese before described?—Yes.

You have studied this, I suppose?—Very carefully.

Do you find anything in the preceding language to tell you what particular oxide of manganese is there intended?—Nothing whatever, and I should say that certainly a chemist would not have thought necessarily of the peroxide; because this is an entirely new use for peroxide of manganese. In the past it has been used in glass making, and it has been unquestionably used in the chlorine manufacture. Apart from those uses of manganese, although Weldon's patent has now expired there has been no use of Weldon mud for any other processes than chlorine manufacture during the whole of the time. So this use of peroxide to separate iron would be so novel that I should think myself that I should have surmised that it would have been one of the intermediate oxides.

May I take it that what is there said would be applicable to the peroxide. If you were told to apply it to the peroxide it would be applicable, but it would be also applicable——?—To any of the others.

Is there anything there which would call your attention, as a chemist, to Weldon mud?—Nothing whatever.

Even knowing, as you must be taken to know, that Weldon mud was a well-known product?—Perfectly well known; and it was perfectly well known that it was a desideratum to get iron separated in this way. In fact, I made experiments for the late Mr. Weldon himself, in which he thought he could find a means of separating iron; but he certainly never suggested the use of Weldon mud.

And there are none of the technical words or processes here described which would lead you to think of Weldon mud?—Not in the provisional specification; none whatever.

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Mr. James Beveridge, sworn. Examined by Mr. Moulton.

Mr. Justice Kekewich: Are you going through a vast array of these gentlemen.

Mr. Moulton: No, my Lord, I have called Mr. Beveridge because I think he can give evidence of a slightly different type, but of great value. I really will cut the evidence short. I will try to get along without calling more than one witness besides this.

Mr. Justice Kekewich: I will not attempt to say that the matter has been threshed out, but there has been a good deal of threshing.

Mr. Moulton: You are, I believe, a technical chemist, of Cardiff, and have been engaged in the manufacture of chemicals on a large scale for the last thirteen years?—Yes. I am not living at Cardiff now; I live at Widnes. I am with Messrs. Hutchinson and Son, of Widnes, now.

Have you given attention to this question of separating iron from aluminous solutions?—I have.

I believe you have read papers on the subject, have you not?—I read one paper before the Society of Chemical Industry.

Have you made experiments as to the action of Mn $O_2$ in removing iron from these solutions?—I have.

Will you tell his Lordship whether Mn $O_2$ uncombined has the power of so doing?—I believe it has not, for this reason, that I tried experiments chiefly to prove whether it would or would not remove iron from sulphate of alumina. I prepared Gorgeu's compound, of which a great deal has been said in this case, and I found there was an inappreciable amount of iron—an amount of iron which I could not estimate—removed. But I put it down chiefly to the fact that that peroxide so prepared was not pure, because it contained only 97·98 per cent. of Mn $O_2$.

For the purpose of chemically purifying it, and subsequently taking out the iron, is the anhydrous Mn $O_2$ capable of being used?—I do not think it is. I am quite of that opinion.

Have you heard what has been said as to the effect of it when it has been hydrated or when it is in combination with a base such as hydrogen?—Do you agree with that?—I quite agree with that.

Do you agree with what has been said as to the composition of Weldon mud?—Yes.

Now with regard to fully oxidising. Have you heard what Professor Dewar has said with regard to that?—I have.

Do you agree with it?—Yes, I agree with it.

Now as to the meaning of the term "peroxide of manganese." Apart from the chlorine trade—I mean the trade in the production of chlorine—is Weldon mud to your knowledge used in any chemical manufactory?—I do not know of any other application except the chlorine industry.

Supposing in the market the phrase "peroxide of manganese" were used what in your opinion would be the meaning of it?—I should certainly think of the native ore first.

Did you ever know Weldon mud in the market at all?—I have known of it being inquired for, but it required a special preparation for that purpose, and when it was prepared it was not applicable.

In your opinion, is Weldon mud in the market, apart from the chlorine trade itself—I will come to that presently—known as peroxide of manganese?—I do not think so.

Now, with regard to the chlorine trade, I think you heard what Professor Dewar said as to its making no difference whether the peroxide was in combination or not in combination. Do you agree with that?—I quite agree with that.

What is the usual name of Weldon mud in the chlorine trade itself?—In my district, which is the Lancashire district, it is always called manganese mud or Weldon mud—by most people, manganese mud.

You have heard what Professor Dewar said about fully oxidising the Weldon mud. Do you agree with that?—I do.

And with regard to what he said as to the nature and the processes in the claim. Do you agree with that?—I quite agree with that.

CROSS-EXAMINED BY MR. ASTON.

You are acquainted now with this trade?—I am.

Do you mean to tell my Lord that, if I wanted to buy a small quantity of Weldon mud, you do not know where I could go to in Widnes to buy it?—No, I do not mean anything of the sort.

Where can I go to buy it as an article of commerce—to what firm?—You could purchase it, no doubt, from any alkali works.

My friend was very careful in putting it to you, apart from the chlorine manufacture or trade. Directing your mind to the bleaching powder trade, that is the chloride of lime trade, is it not?—That is so.

Is it not true that among the chloride of lime manufacturers the terms manganese mud, oxide of manganese, and peroxide of manganese, would be understood as applying to Weldon mud, which contains peroxide of manganese?—I do not exactly follow you. The question is rather a long one.

I put it to you that among the chloride of lime manufacturers—among the people accustomed to it—Weldon mud is spoken of quite commonly?—Yes, it is.

And is it not spoken of as manganese mud?—It is.

Is it not often spoken of as an oxide of manganese?—No.

Is it sometimes?—I do not know. I never heard of it.

Is it sometimes spoken of as protoxide of manganese or peroxide of manganese?—No. I said so before.

You have never heard it?—No, I have never heard it.

How long have you been in Widnes?—Nearly eleven years.

And do you say you have never heard Weldon mud spoken of simply as manganese?—I do not remember any instance of Weldon mud being called peroxide of manganese or even an oxide of manganese. It is almost invariably spoken of as manganese mud or Weldon mud.

At all events, everybody who was acquainted with the manufacture knew that manganese mud when spoken of meant a mud in which the the peroxide of manganese was present?—Yes.

With regard to the fully oxidising of the protoxides that exist in the Weldon mud, I suppose you do not deny the proposition that bleaching powder added to it would do that?—In a scientific sense I believe it will not.

In a popular sense?—In a practical sense you will get something like 98 per cent. of the manganese in a state of peroxide.

That is to say, adding bleaching powder, which is hypochlorite of lime?—Yes.

Adding that you completely peroxidise the protoxides to the extent of 98 per cent. or 99 per cent.?—You completely oxidise the manganous oxide which is in combination with the peroxide of manganese existing in Weldon mud to the state of peroxide.

Practically you do it?—For all practical purposes you can convert 98 per cent. or so of the total manganese into peroxide.

And that was perfectly well known in 1882?—In the laboratory it was.

And it is spoken of by Kynaston in his specification in the following words: "In my new process, now to be described, the agent used in the hydrate of peroxide of manganese, or, more correctly speaking, the manganite of hydrogen or other manganite as precipitated from solutions of manganese by any of the well known means, such as the addition of solution of bleaching powder or other hypochlorite, or of a solution of a permanganate." You heard Professor Dewar say that the oxidising power of the chloride of lime or the hypochlorite of lime properly I should say was well known to chemists in 1882?—It was.

I suppose the chloride of lime manufacturers would well know it. I mean the chemical gentlemen acquainted with the trade would know it?—Yes, they would.

I suppose chloride of lime is a common oxidiser, is it not? It is the oxidising agent we have.

The most common oxidising agent that is employed in the arts, is it not?—That is so.

I understand that you have prepared Gorgeu's method?—I have.

You prepared it, did you not, for the purpose of this inquiry?—I did.

Your object was to ascertain what would be the effect of the material when used for the purpose of removing iron from sulphate of alumina salts?—That is so.

Is there peroxide of manganese present?—In Gorgeu's compound?

Yes?—Certainly.

Did you not find that when you used it you did, as a physical fact, remove some of the iron which exists in the sulphate of alumina solutions?—That is so.

On all occasions?—Inappreciable quantities.

Never mind the quantities; but on all occasions, as a fact, you found it active?—It was not new in that experiment. It was in inappreciable quantities. I could not estimate the iron.

What are the proportions that you used on that occasion. You followed the specification, did not you?—I recollect the proportions. It was not the proportions given in that specification. The point which I wished to prove in that experiment was whether or not this peroxide would remove iron, and I did not follow that. I was satisfying my own mind whether I could prepare a peroxide which would not remove iron.

You wanted to prepare a peroxide that would not remove iron, is that it?—Yes.

And consequently you prepared a peroxide following Gorgeu's formula?—That is so.

When you tried it you found as a chemical fact that the peroxide that you actually did employ did remove iron as a fact, though in inappreciable quantities, is not that so?—That is so, but the peroxide was impure, may I explain. I have found that if the conditions are all constant, and that one thing, namely, the purity of Gorgeu's compound be varied, the proportion of iron removed is in proportion to the impurity of $Mn\ O_2$, that is to say, that when I prepare a very pure peroxide I get a very small quantity of iron removed.

And you found as the result of your investigation that the greater amount of something (which you will tell me presently) which you found associated with the peroxide the better result as far as regards removing iron?—Yes.

What was that something?—I am not exactly prepared to say. I have not made a perfect investigation in this matter. It was manganous oxide, or, in other words, it was essentially a mixture of peroxide of manganese and sesquioxide, or in other words, peroxide of manganese in combination with manganous oxide.

Mr. Moulton: What we have called an intermediate oxide?—It is an intermediate oxide.

Mr. Aston: Do you know for a certainty that that was present?—I have not done it myself. I have not done any absolute research in the matter.

From your experiments in Gorgeu's composition or compound you found that you could remove iron if you were minded so to do in increasing quantities?—Yes.

You have not told me what proportions of Gorgeu's compound you employed in the first instance?—I do not remember the exact figures. I should require to calculate it out.

Then calculate it out, please?—About 20 per cent. That is 20 parts of that peroxide to 100 parts of sulphate of alumina as sold in the market.

For how long a time did you let that operate?—About five hours.

Did not you heat it?—I did not.

You might have let it operate for a longer time if you had chosen, and you might have heated it if you had chosen?—Quite so.

And you might have increased the proportions if you had chosen?—Quite so.

I suppose all chemists would know that you might employ those variations if you wanted to increase the action so as to produce a greater result?—They usually do.

It is a common thing?—In investigation and research.

You have said that you know Weldon mud very well?—I do.

And you have made experiments on Weldon mud in connection with the inquiry before my Lord?—I have.

Did you take Weldon mud and fully oxidise it by adding bleaching powder?—I could not possibly do that.

You did not do that?—I did attempt to fully oxidise it, but could not.

And practically you got the result of a large portion of the protoxides converted into peroxides when you tried to do it? Yes, that is so.

On that occasion 98 per cent. or thereabouts?—Yes.

Therefore, for practical purposes, you would get a complete oxidation in that sense?—Yes, a complete oxidation.

Did you try that?—That manganite of calcium?—Yes.

Did you try that compound which you got for removing iron from sulphate of alumina solutions?—I did.

And it acted well?—No. That is a matter of opinion.

It removed a large proportion of iron?—It does remove iron from manganous solutions.

In large proportion?—Yes, in large proportion.

Did you try that same Weldon mud by separating from the completely formed peroxide extraneous matters present in the compound?—I cannot say that I have done it from that exact Weldon mud, but I have done it from other samples of Weldon mud.

And the residue was peroxide?—No, it was not.

Was the residue a residue in which the peroxide of manganese was present?—In combination.

In combination what with?—With water, with a small proportion of manganous oxide.

That is the unconverted, I suppose?—The unperoxidised, and a small proportion of lime and manganese, probably. That is substantially the composition.

You found that the peroxide of manganese in that form separated from the residue of Weldon mud answered the purpose of removing iron from the sulphate of alumina solution?—Did you say peroxide?

Yes. The peroxide which you have spoken of, which was combined, as you said, with a certain small proportion of peroxide, a certain small proportion of lime, and a certain small proportion of water.

Mr. Moulton: Not a small proportion of lime.

Mr. Aston: Yes, he said so. It was a small proportion of lime, was it not?—Yes. That will remove effectively.

That will remove effectively iron from the solutions?—Yes.

Did you try the residue of the Weldon mud which you had separated from those combined peroxides?—No, certainly not.

You say certainly not, because as a chemist you know they would be ineffective. Is not that so?—Did you mean separately.

I meant separately.—Take, for example, this. If I take Weldon mud and separate the lime and the manganous oxide, do you mean those products will——

If you do not understand my question I will repeat it.—I did not understand it.

You took Weldon mud, and in that Weldon mud existed peroxide of manganese combined with other matters?—Yes.

You have told me that the other matters were a small amount of peroxide, a small amount of lime, and water. You separated the peroxide in the form from the Weldon mud, and left something behind, did you not?—You appeal to me so chemically, and your question is such a chemical one in a sense that I cannot really grasp it.

If you cannot understand me, all I can say is that the question has been put in this court and has been answered in your presence. I will tell you what I mean. Take Weldon mud. That is a compound of various matters, is it not? It is.

Then take the ordinary Weldon mnd. You have told me that you have separated from the mass peroxide of manganese with which was combined protoxide, lime, and water? No, I did not.

You have not done that?—I said I separated lime and manganous oxide from it. That was my intention.

No. I asked you whether you have separated from the Weldon mud the following agents: The peroxide of manganese, the lime, the water, and the protoxides which are found associated with it. Have you done that?—Yes.

I asked you if you had tried that which you have so separated and found it efficient in separating iron from aluminous solutions, and you said Yes. Is that true?—I fail entirely to grasp the point.

You have told me so. Do you go back from it?

Mr. Justice Kekewich: He says he does not understand it.

Mr. Aston: You mean you do not understand the problem. I want you to separate Weldon mud into two parts, one consisting of the peroxide of manganese with the peroxide and lime combined with the peroxide you know, and water combined with the peroxide, and I ask you whether you have separated those bodies from the Weldon mud. I asked you that and you told me yes?—That was not what I understood you to say. I understood you to ask me whether I had separated the bases from Weldon mud, and I said I had to a large extent.

What do you mean by bases?—These bases are lime, manganous oxide, and a small proportion of magnesia.

You have never mentioned magnesia before?—I did.

What did that leave behind?—That leaves hydrated peroxide of manganese, plus a small proportion of manganite of calcium, a very small proportion of manganite of manganese, and also, I believe, a small portion of manganite of magnesia—substantially.

You have tried the bodies which you have last mentioned as agents for removing iron from the sulphate of alumina solution?—I have.

And they answered?—Yes.

All of them?—All of them. Well, there is only one exception, and that is the manganite of magnesia. I have not prepared that independently.

You said that you had also separated the lime, the magnesia, and what else?—The manganese oxide.

Did you try those?—I prepared them independently, and found them all to act efficiently.

The lime acts efficiently by itself. Is that what you mean?—It does not. In combination with peroxide of manganese it does.

Does the magnesia act efficiently by itself?—It does not.

Would lime and magnesia act efficiently?—I do not know; I have not tried it.

Would lime and magnesia and the manganous oxide act efficiently?—I do not know; I have not tried it.

Would lime and magnesia and the manganous oxide act efficiently?—I do not think so.

Then the residue, after you have removed or separated the peroxide of manganese and the other matters that are connected with it, will not act, as far as you know, to remove the iron?—That is so.

Do you differ from the witnesses who have given evidence before my Lord in this, that the hydrated peroxide in the form in which it exists in Weldon mud will not act efficiently?—I do not.

*(To be continued.)*

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

THE market in this quarter continues inert to an obstinate and even singular degree, for although general trade has not as yet plucked up much courage, there is still some bulk of miscellaneous business being put through, to which the chemicals section is far from contributing its just quota. In bichromates, the manufacture of which is a speciality in this quarter, things have been assuming quite a dismal look, and while prices remain unreduced from the agreement figures of the combined makers, as re-adjusted last year, demand threatens to give out altogether. The year as yet has proved a bad one only, and last week turned out to be the worst of the series. This very pronounced weakness characterises both home and foreign orders alike. Bleaching powder is only of very moderate inquiry, and last week's figures are no more than maintained, while caustic soda and one or two others are again the turn down. Sulphate of ammonia is on

report as having been done down to £12, and the top figure for best qualities may not with safety be set down to-day at at anything above £12 2s. 6d. General prices current are:—Soda crystals, 40s., net Tyne; alum, in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £42 net Glasgow; soda-ash, 48/52° 1d., less 5 % Tyne; caustic soda, white, 76° £8 2s. 6d., 70/72° £6 15s., 60/62° £5 15s., and cream, 60/62 £5 15s., less 2½ % Liverpool; bicarbonate of soda 5 cwt. casks, £5 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52 1⅛d., less 2½ % Tyne; saltcake, 21s., less 2½ % f.o.r. Glasgow; bleaching powder, £7 12s. 6d. to £7 15s., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda 3½d., less 5 % and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 10½d.; chlorate of potash, 5⅜d., less 5 % any port; sulphate of ammonia, £12 2s. 6d., f.o.b. Leith; sulphate of copper, £22; paraffin scale, hard, 2 15/16d., soft, 2d.; paraffin wax, 120° semi-refined, 2 11/16d.; paraffin spirit, 5d.; burning oil, 6d. to 6½d.; lubricating oil, 890/895° £7 15s. to £8. Last week's imports included 8,016 bags, and 4,205 baskets sugar (at Greenock), 5,715 barrels of rosin, 6,610 tons of iron ore, 2,075 tons chrome ore, and 570 tons of sulphur ore.

## THE LIVERPOOL MINERAL MARKET.

The market is steady this week. Manganese has rather a weak tendency. Magnesite (containing 98 per cent of carbonate of magnesia) rules steady; prices unaltered at 30s. to 35s. for raw lump; raw ground, £6. 10s. and calcined ground, £10 to £11. Bauxite (Irish Hill brand) continues in demand at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: The slight advance reported last week has been maintained, stocks being low; 80s. to 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate) still scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone: More inquiry; ground, £6 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore: Improvement maintained; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore. 18s. to 20s. c.i.f. for forward delivery. Emerystone in fair demand at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth in steady demand; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore: The demand last reported continues, and prices are firm. Antimony ore, £15 to £18 for fair quality. Antimony metal, £49 to £50. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potter's lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 per cent, packed, £11. 2s. 6d.; 70 per cent, packed, £10; 60 per cent, packed. £8. 16s.; 50 per cent, unpacked, £7. 15s.; 40 per cent, unpacked, £7. 5s. Spiegel, 20 per cent, £4. 12s. 6d. Silicon spiegel, 9 per cent, £8. Chrome pig, 9 to 10 per cent, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

Our market this week still continues steady. Soda-ash 1d. up. Caustic soda: 60 per cent. white at £6; 60 per cent. cream, £5. 18s. 9d.; 70 per cent. white, £7; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda: There is little improvement at 9s. 6d. to 10s. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder, £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 21s. 6d. Bichromate of potash, 4⅜d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11; lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, £21. 10s. to £22. Blanc fixe, £8. 10s. Manganese: Sulphate, £18; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic), strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc (solid), £18.

## THE LIVERPOOL COLOUR MARKET.

Colours steady. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s.; Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d.; Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto, for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

In some branches of the trade there has been rather more inquiry during the past week, but there is little improvement on the whole. Sulphate of copper is a shade firmer, nominal price being £22, but re-sellers are still offering odd lots at slightly lower prices. Nitrate and acetates of lead are well maintained in prices, but the actual amount of business is not large. Nitrate of soda is still dear on the spot. Brown acetate of lime has been sold at lower prices this week to clear some stocks, but market price is about £9 7s. 6d., at usual points. Potash, caustic and carbonate, are more freely offered, but prices are well maintained. Bleaching powder is rather dearer owing to increased demand, hardwood f.o.b. Liverpool being worth fully £7 15s. In other miscellaneous chemicals there are no changes of importance.

## THE ALKALI TRADE.

The lowness of prices and the depression of the trade seems to have been forgotten in general flurry caused by the Chance process of sulphur recovery. Prices continue to droop in the alkali department, the state of affairs becoming very serious. There is a fair demand for bleach though in some quarters we hear there is a falling off in this also. The British Alkali Co. at Widnes, are busy arranging for the erection of Chance's sulphur recovery process, and are now we hear in the market with monohydrated sulphuric acid made by Lunge's patent process. Whether this is a golden egg remains to be seen.

## THE TAR PRODUCTS MARKET.

Many tar-distillers are amazed at the price now being offered and paid for tar in certain quarters, but when it is remembered that there are wheels within wheels, such items should not cause astonishment. The old game of continually doubling the stakes will always secure the game to those who have most to play with; it is the less fortunate ones who will have to look out. Benzol is still in the same inactive state, 3s. 4d. for 90's, and 2s. 7d. for 50/90's. Solvent naphtha is in good demand at old rates. Crude carbolic acid is even

firmer than last week, and anthracene is steadily rising. Pitch is moving off slowly, the patent-fuel makers in this country taking a good share of the production.

## THE SULPHATE OF AMMONIA MARKET.

This market is very quiet but steady, at lower prices however than were ruling last week. The severe weather of the past few days has not conduced to better prices or a stronger demand, as all agricultural work is at a standstill. Hull sulphate is now quoted at £12 to £12 1s. 3d., and Leith at £12. Beckton price is £12 12s. 6d., while London outside makes can readily be bought for £12. 5s.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

Bailey & Co., Upper Thames-street, London, electrical appliance manufacturers.

J. Harland & Co., Vyner-street, Cambridge Heath, glass manufacturers.

Hargreaves Bros. & Co., Kingston-upon-Hull, blue and black lead manufacturers, as far as regards M. H. Hargreaves.

Willdigg Bros., Coventry, mechanical engineers.

J. Groom, R. Powis, and T. Eaton, Priestfields, near Wolverhampton, japanners and galvanisers, as far as regards T. Eaton.

Brown & Griffiths, Dudley, chemical manufacturers, etc.

Norman & Son., Glasgow, electric light engineers, as far as regards J. M. Musgrave.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Marston, George Henry, Lordship-terrace, East Dulwich, Surrey, lately trading at Swiss-terrace, Forest Hill, Commercial-road, London, E., and Whateley-road, East Dulwich, chemist.

Quinlan, John, and Carr, George (trading as Quinlan, Carr & Co.), Bentham, West Riding, and Lancaster, indiarubber manufacturers.

#### Adjudications.

Marston, George Henry, Lordship-terrace, East Dulwich, Surrey, late of Swiss-terrace, Forest Hill, Commercial-road, and Whateley-road, East Dulwich, chemist.

Cleaver, Francis Frederick, Cleaver, Francis Frederick, Jun., and Cleaver, Henry Clifton (trading as F. F. Cleaver & Sons), Nottingham, bleachers and dyers.

Dalton, John (trading as J. & E. Dalton), Newton New Mills, Cheshire, emery-cloth manufacturer.

Quinlan, John, and Carr, George (trading as Quinlan, Carr & Co.), Bentham, West Riding, and Lancaster, indiarubber manufacturers.

#### First Meetings and Public Examinations.

Bragg, William, Harleyford-road, Kennington, and Guildford-street, York-road, Lambeth, engineer. First meeting, March 16, 33, Carey-street, Lincoln's Inn. Public examination, March 28, 34, Lincoln's Inn Fields, London.

Egelstaff, Edwin Herbert (trading as the Hecla Stone Co.), Chepstow, quarry master and stone merchant. March 17, Official Receiver's Office, Newport. March 26, County Court, Newport.

Lockwood, William, and Leith, John, St. Helens, chemical manufacturers. March 20, Official Receiver's Offices, Liverpool. March 19, Court House, Liverpool.

#### Notices of Dividends.

Lewis, John Davies (trading as the Dare Steel and Tinplate Campany), Penarth, near Cardiff and Aberdare, steel and tinplate manufacturer. First and final dividend of 2½d., March 16, or any subsequent day, Saturdays excepted, Trustee's Office, Bath-lane, Swansea.

Simon, S. H., Moscovy-court, Tower Hill, London, drysalter. First and final dividend of 4½d., any day except Saturday, Chief Official Receiver's Offices, 33, Carey-street, Lincoln's Inn, London.

# New Companies.

Anglo-Austrian Tin.—Capital, £90,000 in £1 shares.

Atlanta Gold and Silver Consolidated Mines.—Capital, £650,000 in £10 shares.

Chas. L. Baker & Co. (Electricians).—Capital, £25,000 in £5 shares.

British and Irish Gunpowder Manufacturing.—Capital, £50,000 in £5 shares.

Canning Town Glass.—Capital, £10,000 in £5 shares.

Electrical Works Construction and Maintenance.— Capital, £2,000 in £1 shares.

George Jackson & Co. (Tobacco Manufacturers).—Capital, £30,000 in £5 shares.

Magnetic Iron Mountains Smelting.—Capital, £200,000 in £20 shares.

Joseph Mason & Co. (Paint and Varnish Manufacturers).—Capital, £40,000 in £50 shares.

Patent Indestructible Fuel Cartridge.—Capital, £10,000 in £5 shares.

St. James's and Pall Mall Electic Light.—Capital, £100,000 in £5 and £1 shares.

Sudbury Dairy.—Capital, £40,000 in £1 shares.

Union Cement.—Capital, £25,000 in £10 shares.

Wotherton Barytes Lead Mining.—Capital, £10,000 in £1 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

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**Treating Yellow Liquors.** A. M. Chance and J. F. Chance. 3182. March 2.
**Treating Tea Leaves.** H. Thompson. 3213. March 2.
**Incandescent Lamps.**—(Complete Specification.) J. W. Oldroyd. 3215. March 2.
**Fuel Economisers for Steam Boilers.**—(Complete Specification.) J. W. Oldroyd. 3216. March 2.
**Sulphide of Sodium and Potassium.** F. H. Gossage and T. T. Mathieson. 3218. March 2.
**Measuring and Drawing off Liquids.**—(Complete Specification.) F. Sheame and F. E. Morris. 3225. March 2.
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# PRICES CURRENT.

[THURSDAY, MAR. 15, 188

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

*The values stated are* F.O.R. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids :—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 9 | 0 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 11 | 6 |
| Chromic 82 % ... ... ... ... ... per lb. | 0 | 0 | 6 |
| Fluoric ... ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2¼ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 3½ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) ... ... ... per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 5 | 0 |
| ,, ( ,, 150°) ... ... ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) ... ... ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 6½ |
| Arsenic, white powdered... ... ... ... per ton | 10 | 12 | 6 |
| Alum (loose lump) ... ... ... ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, 880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1⅞ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 48 | 0 | 0 |
| ,, ,, (pure) ... ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 6 | 3 |
| ,, ,, (grey), Hull ... ... ,, | 12 | 1 | 3 |
| Aniline Oil (pure) ... ... ... ... ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ... ... ... ... ,, | 0 | 0 | 8½ |
| Antimony ... ... ... ... ... ... ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... ... ... ... per ton | 8 | 0 | 0 |
| ,, Carbonate (native) ... ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes :—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products :—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 5 |
| Benzol, 90 % nominal ,, ... ...per gallon | 0 | 3 | 4 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 3 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160°... ... per gallon | 0 | 1 | 4 |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1⅜ |
| Copper (Chili bars) ... ... ... ... ... per ton | 80 | 7 | 6 |
| ,, Sulphate ... ... ... ... ... ,, | 22 | 5 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 1 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 16 | 0 | 0 |
| ,, Litharge Flake, ex ship ... ... ,, | 16 | 10 | 0 |
| ,, Acetate (white) ... ... ... ... ,, | 27 | 10 | 0 |
| ,, ,, (brown) ... ... ... ... ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 0 | 0 |
| ,, Nitrate ... ... ... ... ... ... ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 9 | 5 | 0 |
| ,, ,, (grey) ... ... ... ... ,, | 13 | 15 | 0 |

| | £ | s. | d. |
|---|---|---|---|
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | 0 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ... ... ... ,, | 18 | 10 | 0 |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 5 | |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 12 | |
| Methylated Spirit, 60° O.P. ... ... ...per gallon | 0 | 2 | |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 | |
| ,, ,, Miscible, 60° O.P. ... ,, | 0 | 5 | |
| **Oils :—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 4 | |
| Cotton-seed ... ... ... ... ... ... per ton | 21 | 0 | |
| Linseed ... ... ... ... ... ... ... ,, | 19 | 10 | |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 | |
| ,, American ... ... ... ... ,, | 0 | 0 | |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 16 | |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 | |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 15 | |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | |
| ,, Permanganate ... ... ... ,, | 4 | 5 | |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | |
| ,, Sulphate, 90 % ... ... ... per ton | 10 | 0 | |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 10 | |
| Silver (metal) ... ... ... ... ... per oz. | 0 | 3 | |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 16 | |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 11 | |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 7 | |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | |
| ,, Acetate (ex ship) ... ... ... ,, | 19 | 10 | |
| ,, Chlorate ... ... ... ... per lb. | 0 | 0 | |
| ,, Borate (Borax) ... ... ... ... per ton. | 30 | 10 | |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | |
| ,, Hydrate (77 % Caustic Soda)... per ton | 8 | 7 | |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 10 | |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 15 | |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 16 | |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 15 | |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 5 | |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 10 | |
| ,, Manganate, 30/33 ... ... ... ,, | 10 | 5 | |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 | |
| ,, Nitrite, 98% ... ... ... ... per ton | 28 | 0 | |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | 5 |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 12 | 6 |
| ,, Sulphide ... ... ... ... ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 5 | 0 |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 14 | 6 |
| ,, Cane ... ... ... ... ... ... ,, | 0 | 18 | 0 |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | 8 |
| ,, Barium ... ... ... ... ,, | 0 | 0 | 5½ |
| ,, Copper, 60% ... ... ,, | 0 | 0 | 8½ |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 2 | 6 |
| Tallow ... ... ... ... ... ... ... ,, | 26 | 15 | 0 |
| Tin (metal) ... ... ... ... ... ... ,, | 160 | 0 | 0 |
| ,, Crystals ... ... ... ... ... ... per lb. | 0 | 0 | 9 |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 19 | 5 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | 0 |

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5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, March 24, 1888.**


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## Notices.

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munications for the Editor, if intended for insertion urrent week's issue, should reach the office not later **uesday morning.**

les, reports, and correspondence on all matters of t to the Chemical and allied industries, home and , are solicited. Correspondents should condense their as much as possible, write on one side only of the and in all cases give their names and addresses, not rily for publication. Sketches should be sent on te sheets.

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shall esteem it a favour if any of our readers, in inquiries of, or opening accounts with advertisers in per, will kindly mention the *Chemical Trade Journal* as rce of their information.

rtisements intended for insertion in the current issue, should reach the office by **Wednesday morning** latest.

## Advertisements.

ll, prepaid Advertisements, of Situations Wanted or , Premises on Sale or To be Let, Miscellaneous Wants, ecific Articles for Sale by Private Contract, are inser- he *Chemical Trade Journal* at a charge of One Penny rd for each insertion—minimum charge One Shilling.

e Advertisements, Announcements in the Directory ns, and all Advertisements not prepaid, are charged at riff rates, which will be forwarded on application.



## REMOVAL OF THE OFFICES OF THE "CHEMICAL TRADE JOURNAL."

THE growing requirements of our Journal in respect to office accomodation have necessitated, thus early, a removal to more spacious premises. We have therefore to request our friends to note that the future address of the *Chemical Trade Journal* is

**No. 5,**

**JOHN DALTON STREET, MANCHESTER.**

Our new suite of Offices (which are situate at the Deansgate end of John Dalton Street) will, we anticipate, fully meet the requirements of the Journal for many years to come.

It is particularly requested that all communications for the Journal, whether editorial or otherwise, should be addressed **"DAVIS & CO.,"** and **not** to any individual member of the firm.

## THE COUNTY GOVERNMENT BILL.

THIS measure is now before the country, and all concerned have an opportunity of seeing how the wind blows. A big bribe is offered to the landowner and the brewer, What has been offered to the manufacturing chemist? Two things: the certainty of having to face the question of River Pollution at no very distant date, while the Food and Drugs Act may very possibly be controlled from new centres.

So far as the Food and Drugs Act is concerned no honest manufacturer need fear so long as the administrative authority engages the services of competent analysts; but the whole system would be encompassed by much danger if favouritism should ever replace competence. There are several appointments in the country that have been made under this Act the wisdom of which is open to question; but on the whole these Acts have been very well administered, but at the same time we have never been able to see why simply Food and Drugs should be thus cared for: a general Act would have been much more satisfactory, dealing with persons who sold wares of any description which were not of the nature or quality demanded. It is just a question now, whether a satisfactory decision could be arrived at in the case of a man selling soda crystals made from saltcake, or crude naphtha made from benzoline and bisulphide of carbon, unless the articles in question were sold with a warranty. Is this as it should be?

The administration of the Rivers Pollution Act may prove a veritable thorn in the sides of many manufacturers, and many will feel it for the simple reason, that so far as the Northern rivers are concerned, the Act has been a dead letter. It has been many times stated that within the memory of living inhabitants, most northern rivers have been fishing streams, and the now dwellers in the vicinity laugh with incredulity if one ventures to suggest the possibility of their ever becoming fishing streams again. In our opinion, it would not take long to scour the beds of the rivers and streams running through most of the manufacturing districts, and we venture to say, that, within twelve months from the time of stopping the influx of manufacturing pollution, the rivers would be filled with clean wholesome water, instead of the vile stuff with which now many are filled to overflowing.

For our own part we do not see any difficulties in the way of dealing with any kind of refuse whatever, but no general plan can be laid down, each refuse will have to be dealt with according to the locality in which the works are situate. As we have already stated in these columns, the most serious pollutant is the waste bleaching solution from bleachworks

and paper mills, and until our streams are relieved from the task of receiving these outflows, we fear the amelioration of our streams will never be accomplished.

We are well aware that many bleachers and paper makers hold the opinion that the waste bleaching solution which they send into a stream acts as a disinfectant, and nullifies to some extent the evil effects of sewage contamination. The remedy is worse than the disease. In a pure river, wherein a copious crop of weeds are growing, organic matter is extracted and the water purified; if, however, weeds are absent, this action is almost entirely suppressed. Bleaching powder, even in extremely dilute solution, is most poisonous to plants and fish, and both plants and fish are the natural scavengers of healthy rivers; disturb this balance of nature and we get our rivers converted into open sewers, such as many of them are now, and the healthy state of a running stream may be pretty well judged by the state of the vegetation growing in it. Let us hope the County Boards will help to restore this vegetation, and succeed where the existing authorities have failed.

## TRIAL TRIPS OF PETROLEUM STEAMERS.

THE trade in carrying petroleum in bulk has lately assumed great importance, as the advantage of doing away with the expense of barrels and the labour attendant upon making and stowing them is of great importance to the consumer by cheapening the cost of import. The first vessels built on the Clyde for this new and important trade are the *Ocean* and *Chester*, lately launched by Messrs. Russell and Co., of Port Glasgow. These vessels are sister ships, 310 feet long, 39 feet beam, and 25 feet depth of hold, and are capable of carrying 3,500 tons of oil and 300 tons of bunker coal. They are divided into sixteen separate oil compartments and into twenty-three separate watertight compartments altogether, and are thus, from an underwriter's point of view, unusually safe against the risks following collision or stranding. They are built of steel throughout, and the machinery, which consists of triple expansion engines with cylinders 22, 36, and 58 inches and 42-inch stroke, working at 160lb. boiler pressure, and is constructed by Messrs. Duncan Stewart and Co., of Glasgow. Both the ships and machinery are from the specifications and under the superintendence of Messrs. Flannery and Blakiston, consulting engineers, Liverpool. On the trial trip, on the 24th ult., the highest speed—the vessels being loaded down to their full carrying draught—was 11 1-10 knots, and the true mean speed over a series of runs on the measured mile was 10½ knots, a result which was nearly a knot in excess of the builders' contract, and was considered exceedingly satisfactory by all on board. The engines worked with remarkable smoothness, and there was not a heated bearing throughout the trial. In view of the special character of the vessels, they have been inclined and their stability calculated by Professor Jenkins, of Glasgow University, and in this respect they have been found entirely satisfactory. These vessels were built to the order of Messrs. Hermann Stursberg and Co., of New York, and are registered in Liverpool.

## THE MANUFACTURE OF SUGAR FROM SORGHUM.

THE British Consul at Chicago, in a report just laid before Parliament describes the results of experiments made during the past seven years in the United States to obtain sugar from sorghum juice. Aided by Government grants, these experiments were so successful last year that they have, it is confidently believed, placed sorghum sugar-making among the profitable industries of the country. The State of Kansas has been the first to demonstrate that it is practicable to extract sugar profitably from sorghum. The Consul states that the experiments show that, taking seven and a half tons of clean cane as an average yield per acre of land cultivated with sorghum (and good cultivation can increase the yield to 10 and even 12 tons) this will produce 750lb. of sugar, 1,000lb. of molasses, 900lb. of seed, 1,500lb. fodder, and 1,500lb. of exhausted chips (dried), and that the total value of sugar, molasses, and seed is about £11. 18s. For the corresponding gross yield of 10 tons of sorghum, at eight shillings per ton, the farmer will make £4 per acre for his crop, or more than double the yield of a crop of wheat or corn; while as a gross product of agriculture and manufacture it is said that six times as much per acre will be realised from this industry as is usually realised from cereals in the State of Kansas. Sorghum seed is said to be of about equal value with corn for feeding purposes. Mr. Fisher describes in detail the working of one of the experimental factories during 1887, and the various processes through which the cane goes. The farmer's part is the most important of all, and it is thought that much may be done by experiments to improve the canes, on the same principle as beet for sugar has been improved, by careful nursing, producing different hybrids, and preserving seed only from such cane as has been shown by analysis to contain the greatest amount of sugar. It is also thought that the length of the season for working sorghum may be extended by the development of earlier varieties, and by cultivation.

## SUGAR ITEMS.

THE production of a crop of about 1,300 tons of sugar means an expenditure for oats and oil meal alone for the stock, of some $10,000, and although a moderate outlay would suffice to produce from the estate lands the necessary amount of grain and meal, leaving a large profit to the proprietor, yet the experiment has not been made, and we are satisfied to continue in the old groove and fear to free ourselves from old prejudices.

The heavy losses hitherto sustained by the use of antiquated and defective machinery and appliances can no longer be tolerated, if those interested in the cane sugar industry expect to compete successfully with the producers of beet sugar. The age in which we live does not admit of any hesitation, which, under present circumstances, would be fatal to the former industry. The return of beet per acre in Germany is about 12 tons, which yield about 1½ tons of sugar, and the total cost varies from £8 to £11 per ton.

With the best machinery now in use (the average number of tons of canes per acre being about 20), the yield of vacuum pan sugar per acre may be computed at about 1¾ tons. But by improving the modes of culture, and thereby increasing the yield from 20 to 26 tons of canes per acre, and even over, and by substituting the Diffusion process with all the recent improvements for our mills and copper walls, an increase to 3 tons of superior vacuum pan sugar per acre may fairly be anticipated, with the result of a diminution in the actual cost of production of at least 25 per cent. while effecting a considerable improvement in quality. And let me ask, under such circumstances, can any one now doubt that a new era of prosperity is opening for the cane sugar producer, if he can only manage to secure the necessary capital to take advantage of the great scientific improvements in machinery and manufacturing appliances of recent years, which prove beyond a doubt that no plant can yield sugar at as great a profit as the sugar cane, for the Diffusion system is now an accomplished fact? The defects which at one time existed, have vanished before the scientific researches of those, who, from the very beginning, predicted for it a bright future. The cane slicing machines have now been brought to great perfection, and everything else connected with the process.—*The Tropical Agriculturist.*

## COTTONSEED HULL ASHES AS A FERTILISER.

THE following experiment is reported by the Georgia Department of Agriculture:—

Considerable quantities of ashes are obtained at cottonseed oil mills, from burning the hulls of the seed for fuel. Although rich in potash, it has been held by some that these ashes should not be mixed with acid phosphates, because of their reducing effect upon the soluble phosphate present. Chemically it is true that carbonate of potash (the form present in ashes) added to a soluble phosphate does precipitate a double phosphate insoluble in water. Analysis, however, shows this to be soluble in a solution of ammonia citrate (the reagent used to extract "reverted" phosphate from manure), and this experiment was instituted to determine if the precipitation destroyed the availability of the phosphate in the soil.

Light coloured cottonseed hull ashes were used. Analysis showed them to contain potash, 20·15 per cent.; phosphoric acid, 6·10 per cent.

The following mixture was made:—

| | |
|---|---|
| Acid phosphate | 200lb. |
| Nitrogen mixture | 41 |
| Ashes | 45 |
| | 286 |

(Forty-five pounds ashes contained as much potash as 75lb. kainit.)

The acid phosphate contained:—

| | |
|---|---|
| Soluble phosphoric acid | 11·50 per cent. |
| Reverted ,, | 2·50 ,, |
| Insoluble ,, | 1·50 ,, |

The nitrogen mixture contained in the 41lb. 5·8lb. of ammonia (actual and potential).

If no chemical change took place, the mixture should have analysed:—

| | |
|---|---|
| Soluble phosphoric acid | 8·04 per cent. |
| Reverted ,, | 2·70 ,, |
| Insoluble ,, | 1·07 ,, |
| Potash | 3·13 ,, |
| Ammonia | 2·03 ,, |

As a matter of fact, after standing one week, the mixture was found to weigh 275lb. (having lost 11lb. of carbonic acid gas, water, etc.), and a sample analysed yielded:—

| | |
|---|---|
| Soluble phosphoric acid | 7·65 per cent. |
| Reverted ,, | 3·55 ,, |
| Insoluble ,, | 1·10 ,, |
| Potash | 3·30 ,, |
| Ammonia | 2·09 ,, |

27·5lb. of the mixture were applied to a section (1-20 acre) of the plot on which experiment three was conducted. It yielded as follows:

| | Seed cotton, per acre. |
|---|---|
| Basal mixture and cottonseed hull ashes | 936lb. |

This combination of potash, therefore, made a better yield than either the kainit or muriate.

I have no hesitation in recommending the mixing of cottonseed hull ashes with acid phosphate.—*Oil, Paint, and Drug Reporter.*

## PURE BEER.

MR. E. R. MORITZ, chemist to the Country Brewers' Society, sends the following letter to the *Times*:—

Sir,—I observe in your report of "Briant *v.* Faulkner," tried on Tuesday before Mr. Justice Kay, that the interesting features in the case consisted in the facts disclosed about brewing and the judge's observations on the ingredients used at the present day in the manufacture of beer. Mr. Justice Kay observed that instead of beer being nowadays brewed from good and wholesome malt and hops, chemical processes were used for extracting beer from what was called invert sugar; and he went on to comment in severe terms upon the sulphuric acid and gypsum employed in the process in question. As a matter of fact, however, beer is not extracted from invert sugar, and the process referred to consists in the preparation from cane sugar of invert sugar, which some brewers find it advantageous to mix in small proportions with their malt worts. Sulphuric acid certainly plays a part in the conversion of the sugar, but none of it, as such, is permitted to remain in the sugar, and consequently none can enter the beer; indeed, by conversion into gypsum the acid is, to all practical purposes, removed, and against the minute quantity of gypsum which may escape separation there cannot possibly be the minutest objection. It occurs naturally in the celebrated well waters of Burton, and it is in no inconsiderable degree responsible for the delicacy and flavour of the popular ales brewed in that district.

With regard to the use of sugar in brewing, it cannot be too frequently insisted upon that its employment is adopted simply to meet the requirements of the public taste in certain districts, and not with the object, which some persons would have us believe, of putting extra profits into the brewers' pockets. Nor must it be forgotten that our malts are by no means invariably "good and wholesome," and that intermixture with sugar solutions of good quality is productive of a sounder, purer, and more wholesome beer than that obtainable from the bulk of our malts when used alone.

Persons with any leanings towards so-called "pure beer" would do well to refer to Mr. Goschen's remarks to a deputation of hop and barley growers which waited on him on April 5 last year. Mr. Goschen pointed out that during the course of the prosecutions for beer dilution, so many of which took place about that time, the beer samples had been generally tested for deleterious substances by the Government chemists at Somerset House, and that not a single sample was found to contain any. Yet some of these beers had assuredly been in part brewed from that invert sugar which Mr. Justice Kay so severely denounces. Indeed, the pure beer cry, like so many of the agitations against brewers, is almost exclusively supported by privileged and irresponsible utterances, which, when critically examined, as was the case on April 5 last year, are found unsound and devoid of proper foundation.

## THE COPPER RING.

THE report read at the last meeting of the Société des Metaux states that the fall in the price of copper, which was due to the action of operators for the fall, and which exposed the copper industry to ruin, has ceased. The society has modified the situation and averted irregular fluctuations by buying direct from the producers, who were as anxious as itself to escape the risks of speculation. Both production and consumption are increasing in proportion, and the anticipation of over-production has not been justified. The important purchases made by the company, which were in excess of its requirements, have been resold at a remunerative price to M. Secretan, on the understanding that he engages to return them to the company without increase of price as its needs may require. In order to extend the field of the company's operations, an extraordinary meeting will be held, when the council of administration will ask for authority to increase the capital by 25,000,000 francs by the creation of 5,000 new shares. The profits for last year amount to 16,000,000 francs, and the dividend will be fixed at 60 francs per share, after setting apart the sum of 8,000,000 francs for a reserve fund. The report was unanimously adopted, as well as all the resolutions proposed.

## A FIELD REFRIGERATOR.

A USEFUL adjunct to the hospital department of the Army has been devised by Dr. F. W. Chapin in a refrigerator for field use with the army on service. It is an adaptation of the "Eureka" refrigerator, in which the chemical agent used is nitrate of ammonia, which has the property of rapidly cooling any liquid to which it is added. The nitrate, moreover, is recoverable from the solution by evaporation, and can be used over and over again without sensible loss. The apparatus consists of two collapsible indiarubber buckets, one of which contains a coil of indiarubber tubing. This coil is placed in one of the buckets, and is immersed in the nitrate of ammonia solution. The water to be cooled is passed through the coil and is rapidly cooled, and forms a supply for drinking or other purposes. For refrigerating purposes and for making ice some of the water which has already been cooled is run into the second bucket, and nitrate of ammonia is added to it, forming the freezing mixture. When the solution is exhausted it is removed for evaporation. The field refrigerator is collapsible, and when open and in use it measures 3ft. by 2ft. by 1ft. 6in.; closed for transport its dimensions are 3ft. by 10in. by 1ft. 6in., and its weight is under 100lb. when packed with a sufficient quantity of nitrate of ammonia for four days' use. We recently inspected one of these field refrigerators at the office of the "Eureka" Refrigerating Company, 100c, Queen Victoria-street, London. It is said to be capable of producing 5lb. of ice per hour, and of cooling eight gallons of water to a temperature of between 30° and 40° Fah. during the same period. It is thought that it will prove of great value to the army in the field for hospital use.

ALIEN WORKMEN.—The Paris Municipal Council has just decided that contractors employed by it shall be debarred from having more than 5 per cent. of foreigners among their workmen.

# Legal.

## HIGH COURT OF JUSTICE. CHANCERY DIVISION.

(Before Mr. Justice Kay.)

BRIANT V. FAULKNER.

This was an interesting case to beer drinkers. Mr. Lawrence Briant, the plaintiff in the action, is an analytical chemist, and he now sought to establish his right to share as a partner with the defendant, Mr. Frank Faulkner, the manager of a firm of brewers, in the profits of the business of bringing out a process for extracting "invert sugar" from cane sugar. The interesting features in the case consisted in the facts disclosed, and the observations made by his lordship in reference to the ingredients used by brewers in the present day in the manufacture of beer.

Mr. Ince, Q.C., and Mr. Le Riche appeared for the plaintiff; and Mr. Renshaw, Q.C., and Mr. Chadwyck Healey for the defendant.

Mr. Justice Kay, in giving judgment last week, observed that the evidence disclosed one of the mysteries of the brewing business. It appeared that nowadays, instead of beer being made out of good and wholesome malt and hops, chemical processes were used for extracting beer from what was called "invert sugar." It seemed that this invert sugar process had been introduced into the manufacture of beer, and people were drinking the product believing it to be beer. The defendant considered that he might save expense and add to the profits of brewers if he instructed them how to manufacture invert sugar from cane sugar for themselves. He took counsel with the plaintiff Briant, and having the conduct and management of a brewing business, and having the advantage of using the works of the brewery for experimental purposes—whether that was an advantage to the consumers of beer might be doubted—he and Briant worked together in the matter. It appeared that the chemicals used for making invert sugar were sulphuric acid and common whitening, and the main feature of the invention seemed to be the doubling the amount of sulphuric acid, and then, his lordship presumed, neutralising the sulphuric acid by means of the whitening, and thus making a product from which beer was concocted by certain brewers. What evidence, then, was there of a partnership between Briant and Faulkner in this concoction of stuff which was called beer? His lordship then dealt with the merits of the case, and in the result dismissed the action, holding that there was no evidence of the existence of any partnership between Messrs. Briant and Faulkner.

## DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ AND CO. *v.* PETER SPENCE AND SONS.

EXPERT EVIDENCE.—*concluded.*

I will put it in this form. Do you agree that the greater proportion of hydrate which you have with the peroxide the more efficient the peroxide is for the purpose?—That is actually what I found.

Did not you find that the more you employed the peroxides that were in a more or less hydrated condition—I dare say my chemical terms are not strictly accurate, but you know what I mean—did not you find that the more nearly you caused your peroxide to approach the anhydrous condition the less efficient you found it?—That is so.

Mr. Justice Kekewich: There is very little fact left in this case; we are getting down to some very interesting legal questions.

Mr. Moulton: Yes, my Lord. Now I am just going to clear this up.

RE-EXAMINED BY MR. MOULTON.

With regard to the Weldon mud, you have said it is largely a combination of the peroxide Mn $O_2$ with a base of lime and manganite of calcium, Ca O?—That is so.

That would be the chemical formula, would it not? *(Handing a slip of paper to the Witness)*—This is what is usually given.

That is Mn $O_2$ Ca O. My friend, Mr. Aston, has you removed the lime from that, and you said yes you removed the lime, in what form was the ma left?—In the hydrated form.

Will you give me the formula for that?—Mn $O_2$ H

In other words, if you had substituted for that C Precisely.

Mr. Aston asked you whether the lime by itsel work?—He did.

Is there in that fact anything whatever inconsist your opinion that Mn $O_2$ must be in combination incapable of acting. Is there anything in the fact t without manganese will not act with your opinion $O_2$ must be in combination to act?—No.

I will put it in another form.

Mr. Aston: He is your witness, you know.

Mr. Moulton: In the new form in which the M this Mn $O_2$ $H_2$ O, is it still in combination?—Certair

Mr. Moulton: Now I only propose to call Mr. K to ask him about first and true inventor.

---

Mr. Josiah Wycliffe Kynaston, sworn. Examined Moulton.

I believe you are a chemist, and have occupied you many years with various branches of commercial che —I have.

And had you before August, 1882, devoted a cons time to the problem of freeing aluminous solutio iron?—I had.

Had you invented any methods prior, say, to the of 1882—or rather, I will ask you had your in methods that had been published?—My first proc invented in 1879, and I worked it continuously up to

What process was that?—There were two patent mode of purification. The first one was arsenious a ferrocyanide of potassium to be used in a particular

Now I will take you to 1882. Did you in 188 further experiments for the purpose of discoverin ways of effecting the object?—I did.

Will you tell my Lord with what result, as ne possible giving his Lordship the date at which you at the result?—I began my experiments some time month of June, 1882, and I continued them, not intermission, but from time to time, until approach end of July. By that time I had established in m that the manganite would remove the iron absolute solutions of sulphate of alumina.

In those manganites kindly tell his Lordship wh would include as the principal ones?—The Weldon the combination known as Weldon mud.

What do you consider that to be a compound of ganite of calcium, manganite of hydrogen, and mang manganese mainly—mixed with some other substanc have no influence upon the process.

Did you, on the 10th August, apply for a patent f discovery?—I did.

Kindly look at the provisional specification. Spea a chemist, does that in your opinion describe the na your invention?—I think so clearly.

Had you met with the difficulty then of manganese into solution?—I had.

Had you in your opinion overcome it?—I had.

And do you state there how you overcome it?— provided for its removal afterwards.

Had you further met with a difficulty with regar iron not being in a completely oxidised state?—I fou to be the essential part of the process.

That it should be?—Yes, that the process could commercially successful unless it was.

Did you state what you discovered in regard to this provisional specification?—I do.

Was that discovery made by you yourself?—By I had no assistance in the work.

CROSS-EXAMINED BY MR. ASTON.

You appeared before the law officer to support you to be the first and true inventor, and on that occasi claim to be the first and true inventor was oppo Messrs. Spence?—That is so.

I think you were fully heard on that occasion, a filed declarations pretty much to the effect that yo stated here to-day?—Yes, I did.

Mr. Justice Kekewich: If you are going into the tions, Mr. Aston, I should like to have them.

Mr. Aston: I am not going into them, my Lord.

stice Kekewich: Then you take his statement that
larations in substance agree with what he has said
ay?
ton: Yes, my Lord, in substance.
stice Kekewich: Then there is no going back from
ement; there must be no comparison, after this,
t he said on the former occasion.
ton: No, my Lord.
t whether you were examined *viva voce* at that time?
was not, the only witness examined was Mr. Watson

was reference, was there not, of your provisional
ion, and the provisional and complete specification
. Spence to Dr. Odling?—Dr. Odling was appointed
s. Spence and myself to act as assessor to sit with
ney-General.
t know that you agreed, but he did act as assessor?

reported to the Attorney-General?—He reported
torney-General.
pon you were directed by the Attorney-General
patent would only be allowed to proceed upon the
t it was dated the 12th instead of the 10th?—That

ponents, Messrs. Spence's, patent was dated the
es.
th August that is?—Yes.
ur's was dated afterwards in order that Messrs.
might be dated as to a prior date by the decision of
ney-General?—In order that whatever was con-
Spence's specification might be secured to them.
you your Letters Patent here?—I have a copy
now.
not mean the specification, the actual Letters
-No, I have not them here.
s a clause in the Letters Patent to which I wish to
attention.
ulton: It is printed in some book.
ton: Then you will take it?
ulton: Yes, of course.
on: You need not say "Of course."
stice Kekewich: I should say "Of course," and I
ashamed of any leading counsel who would not say

on: I am obliged to your Lordship. I am sure I
d my friend would.
ve made your application to revoke the patent of
pence?—No, I have not.
xisted under a seal by you ever since?—Yes.
te in your specification on page 2, line 25: "And
e form I prefer. I use the recovered manganese
Weldon mud, and so extensively used in the manu-
chlorine?"—Yes.
, is it not, the preferable material that you
, and that Messrs. Kurtz employ under your
for the purpose of separating iron from sulphate of
olutions when they use it?—Yes, that is so.
know of your own knowledge, Mr. Kynaston, if
urtz do use, in their works, the Weldon mud in the
efer to in your specification?—I do.
id you last see it used?—In these works?
t would be about the end of May or June this year.
n abroad since then.
cognisant of all the sulphate of alumina cake that
manufactured?—Yes I am.
uch have they manufactured altogether, in your
oughly?—Somewhere between 80,000 and 100,000
ould think about 85,000 tons.
uch have they on their works now?—I do not know.
quantity?—I know they have sold a considerable
I do not know what they have there.
Ir. Kynaston, Weldon mud is a material that is
known in Widnes and the Lancashire district,
ll manufacture is carried on?—It is known to all
ne manufacturers.
d?—No, it is not sold. I have been a manufacturer
mud myself for eleven years, and during the
hat time I was never asked to sell it.
quite sure of that?—Positive.
you give it away?—No, it is for use. We produce
n the manufacture of chlorine.
the chlorine manufacturers know of its existence
name of Weldon mud?—Oh, yes.
ganese mud?—Or manganese mud.
of manganese mud?—No.

Peroxide of manganese?—No. It is never spoken of as oxide of manganese.

Not as oxide of manganese mud?—It is never spoken of as oxide of manganese mud. It is spoken of as manganese mud and Weldon mud, and commonly as mud—black mud. There is always a difference in the works in the use of the term. For instance, in the chlorine works there are stills in which manganese ore is used, and they are spoken of as the "manganese stills." There are other stills in which the mud is used, and those are called "mud stills."

Do you know Whaite Brothers?—Yes, I do.

Do you know Muspratt's—I do.

Do not you know that they have sold hundreds of tons to Messrs. Spence?—I do not know it, and if I heard it I should doubt it very much.

And you do not know of any Weldon mud being sold to anybody now in Lancashire?—No. I have heard that Messrs. Spence had purchased it, but that is the only purchase of it I know.

Then if Messrs. Spence purchased it, they must purchase it from somebody who sells it?—Of course.

Prior to August 1812, there was no use for Weldon mud, apart from the chlorine manufacture?—Not so far a I know.

But the chlorine manufacturers who produced the Weldon mud used it over and over again in the production of chlorine?—Yes.

That is a common thing?—Yes, that is a common thing.

Mr. Aston: In your provisional specification, Mr. Kynaston, you say "To extract the iron I add freshly precipitated hydrated peroxide of manganese or Weldon mud preferably after washing with acid?—Yes.

At that time you used, as meaning the same thing, hydrated peroxide of manganese and Weldon mud?—No, they are two distinct substances. I can say that hydrated peroxide and Weldon mud are two distinct chemical substances.

Then you do not mean these as referring to the same thing?—Oh, no, they are two distinct substances. I could not make such a mistake, I think. If I take Weldon mud and wash it with acid as I say I do, I then get peroxide of manganese, the agent first described.

Then if you take Weldon mud, which you prefer, or in the state in which you prefer it, then you take peroxide of manganese?—No, I do not; Weldon mud is not peroxide of manganese and does not contain peroxide of manganese in a free state.

Well, your witnesses say that it contains peroxide of manganese combined with lime and water and protoxide?—I quite agree with that.

And I suppose you agree that the protoxide would be converted into a peroxide, largely and almost entirely if you added an oxidising agent such as chloride of lime?—I say that it would not be fully oxidised by any such treatment as that in a mode such as is to be applicable to this manufacture.

You say it would not be completely oxidised?—Yes; it would not be completely oxidised.

I do not say it would, but it would be very largely oxidised?—It would be oxidised probably to the extent of 95 per cent.

Your witnesses say 98 per cent. Do you agree with that?—No, I do not agree with that.

Your result gives 95 and the other gives 98?—If I may be allowed to explain, the way in which that question was put to him did not convey the same question which you are putting to me now.

Mr. Aston: Well, my Lord, will you remember how it was conveyed, and I will pass on.

The Witness: Yes, but it was an entirely different reaction.

I will not trouble you with an explanation of the reaction. I have it already?—I will explain, if you like, how I oxidise it in the only efficient way.

Mr. Justice Kekewich: Mr. Aston does not wish it.

Mr. Aston: Now, you applied for a German patent, did you not, Mr. Kynaston?—Yes.

And I suppose you have had a translation of it supplied to you?—No, I have not.

Have you not?—No; I have seen a translation since this case opened, not before.

That will answer my purpose. Where is the translation. Look and see if you recognise it as a translation of the claims you have made in your German patent?—I think it is likely to be so.

Will you hand it me back. Now that is the same invention that you applied in Germany for a patent for—the same

invention for which you had obtained your patent on the 12th of August now in question before my Lord?—Yes.

And these are the patent claims which were made, and which you have seen and approved of?—No, I do not approve of them. I never saw them and did not know of their existence until after the opening of this case. I do not understand German, and there has evidently been a mistake made in the translation. It does not carry out my English specification clearly.

At all events this is a translation which you say you have seen, and which you properly admit is a fair translation of the claims in your German patent.

Mr. Justice Kekewich: Wait one moment. Do you admit that that is a proper translation of the claim of your German patent?—I do not understand German, my Lord, but I think it is very likely to be so. I think it is.

Mr. Justice Kekewich: I thought, Mr. Aston, that you were putting his admission a little too high.

Mr. Aston: My Lord, he said that he had seen that translation.

Mr. Justice Kekewich: He does not know whether it is a translation or not. There is a proper way of proving an English translation of a foreign document.

Mr. Aston: Then, my Lord, I will prove it, if it is necessary.

Mr. Justice Kekewich: I think you must have got the witness here.

Mr. Moulton: I will not put my learned friend to any difficulty. I will read it, and I will tell him if it is a fair translation. [*After seeing the document*] I am sorry to say I cannot read the German handwriting, though I understand the language. Mr. Esilman will perhaps read it to me. [*Mr. Esilman here assisted Mr. Moulton with the document.*] It is not at all a strict translation; it is quite free, my Lord.

Mr. Aston: Then we will have it translated.

Mr. Justice Kekewich: It must either be an admitted translation or it must be strictly proved. You admit that it is a rough translation, Mr. Moulton?

Mr. Moulton: It is a rough translation, but it is not an exact translation. The German is fuller in its language, but I daresay it is a fair translation. I know what the point is, and I do not really want to make a difficulty. I do not think I ought to say that it is a translation, but it seems to me a substantial translation.

Mr. Justice Kekewich: If you admit that it is a rough translation I think it will answer all the purposes of the cross-examination, if anything turns upon it, however, I must have an accurate translation.

Mr. Aston: Now, first of all, what you claim there is "Freeing solutions of sulphate of alumina from iron by adding to the neutral solutions peroxide of manganese (mangan super oxide)?"—That is evidently a mistake in the translation of the English patent, of which I was not cognisant.

It is stated to be a translation of the English patent?—The translator has made a mistake in conveying the term.

In what respect is it a mistake in your opinion?—Because I say I do not use peroxide in the sense in which the word is used in that specification.

But the peroxide of manganese is the active agent which you employ?—Peroxide of manganese by itself is just as useless as so much sand. It cannot be called an active agent in that sense.

So you say, but the dark manganese without being hydrated answers the purpose?—Yes, when it is in combination. It is absolutely useless without combination.

Mr. Moulton: That is my case, my Lord. Now, my Lord, with regard to the information which has to be derived from the Railway Company.

Mr. Aston: I was going to tell your Lordship that I would propose to clear up that point by calling Messrs. Daglish's traveller, Mr. Lucas. I am sorry to say I cannot get any further information from the London and North Western Railway Company, but after you have heard all that Mr. Lucas can tell you, I think there will be very little more to be elicited.

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Mr. Josiah Wycliffe Kynaston, recalled. Further examined by Mr. Moulton.

You heard the evidence of Mr. Lucas?—Yes, I did.

And you heard where he said that he got what he called Weldon mud?—Yes.

What place was it?—From the St. Helens Chemical Company.

Had you any connection in 1882 with the St. Helens Chemical Company?—I was the manager of that Company.

Now, is it a fact that Weldon mud was thrown aside in heaps in the St. Helens Chemical Works?—Oh, dear no. It was most carefully retained and most carefully used.

Now, was there any black mud which was thrown aside in the way he described?—Yes, there was.

What was that?—It was the settlings from a stage in the Weldon process. When the carbonate of lime is added to the chloride of manganese liquors and neutralises those liquors, and it throws down the peroxides, the iron, the alumina, and a large quantity of sulphate of lime contaminated with a small quantity of Weldon mud, a trifling trace only.

Is the clear liquor then drawn off, and the Weldon mud process then commenced?—And so produced that separation of this mud. That mud we used to sell; that is a small portion of it, but a great deal of it was thrown away, as he states; there are hundreds of tons lying about the neighbourhood.

CROSS-EXAMINED BY MR. ASTON.

Are you able to say, Mr. Kynaston, whether on the 2nd or 3rd, or I will say between the 1st of August and the date on which you applied for your specification, the 10th, that there was no Weldon mud on the works where you were manager? Oh, yes there was.

Where would that Weldon mud exist?—In the Weldon mud tanks mainly, and in the still.

Are those open?—They are open to the air, at the top; but you have to ascend to get at them.

But there are ladders there?—Yes.

Therefore access to the tanks was possible?—It was not possible for a stranger to get access to them.

I did not say strangers?—A workman could extract some.

Workmen could get what they wanted?—Yes, certainly.

What was the colour of Weldon mud?—A brownish black colour, more or less black.

And what was the colour of the other stuff?—I am talking about the manganese mud.

You told my friend there was something else thrown aside?—That was not quite so black as Weldon mud, brownish, but a stranger would not distinguish the one from the other.

Do you think that a person accustomed to Weldon mud would know it when he saw it?—I think he would.

There is no doubt about that?—I think not.

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## TABLE OF VALUES OF SULPHURIC ACID.

BY A. H. ELLIOTT.

THE accompanying table is the result of a careful selection of figures from standard authorities, and calculations from those figures have been worked out into forms that are constantly needed in a chemical manufactory. The columns with headings marked "Degrees Beaumé," "Specific Gravity," and "Per Cent. of $H_2SO_4$," are after the figures of the table of the Manufacturing Chemists' Association. A comparison of these figures with those of Bineau and Kolbe, shows them to be the latest and most reliable result. The sixty-sixth degree of Beaumé is placed at 1·835 specific gravity, not because this is the highest attainable strength, but because this is the specific gravity of the acid sold and branded "66° Oil of Vitriol" in commerce. Acid of a higher specific gravity is difficult to prepare, and is unnecessary for the ordinary uses to which oil of vitriol is put. In other words, "Oil of Vitriol" contains ninety-three and a half per cent. of monohydrated acid ($H_2SO_4$), and this is now a settled question amongst chemical manufacturers.

Starting with the above data, I have calculated the weight of a cubic foot of acid at the various densities, and worked out the figures in the other columns. I have added the nearest degree of Twaddel's hydrometer corresponding to the various specific gravities. This latter hydrometer is a much more reliable instrument to place in the hands of a workman than that of Beaumé, because the degrees are more easily read, and a difference of a quarter or even a half degree does not make as much difference as the same error on Beaumé's scale. But since it is a trade custom to use the latter hydrometer, a definite understanding of its value is very important.

The boiling points given are after the figures of Dalton. The specific gravity of sulphuric acid in the accompanying table is that obtained at a temperature of 60° Fahrenheit

(155 Celsius). The number of degrees Fahrenheit, causing a rise or fall of one degree Beaumé, is given in the last column. Thus a rise or fall of 40° Fahrenheit in the temperature of acid ranging from sixty to sixty-six degrees Beaumé (at 60° Fahrenheit), causes a fall or rise of one degree Beaumé. In other words, acid of 63° Beaumé at 60° Fahrenheit will stand 62° at 100° Fahrenheit; or it will stand at 64° at a temperature of 20° Fahrenheit, and so on for each set of figures given in the last column.

The term O.V. in the table is the contraction of "Oil of Vitriol," or acid of 93·5 per cent. of $H_2SO_4$. The term 60° acid means acid containing 77·6 per cent. $H_2SO_4$.

## TABLE OF VALUES OF SULPHURIC ACID.

| Degrees Beaumé. | Specific Gravity. | Per cent. $H_2SO_4$. | Per cent. O.V. | Weight of cubic foot. | Per cent. 60° Acid. | Pounds of O.V. in cubic foot. | Pounds of 60° Acid in cubic foot. | Nearest degree of Twaddel. | Boiling Point, Degrees Celsius. | Boiling Point, Degrees Fahr. | Correction for Temperature |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1·005 | 0·93 | 1 | 62·8 | 0·73 | 0·62 | 0·45 | 1 | ..... | ..... | ..... |
| 2 | 1·011 | 1·87 | 2 | 63·2 | 1·46 | 1·26 | 0·92 | 2 | ..... | ..... | ..... |
| 3 | 1·023 | 3·74 | 4 | 63·9 | 2·92 | 2·55 | 1·86 | 4·5 | ..... | ..... | ..... |
| 4 | 1·029 | 4·67 | 5 | 64·3 | 3·64 | 3·21 | 2·33 | 5·7 | ..... | ..... | ..... |
| 5 | 1·036 | 5·61 | 6 | 64·7 | 4·37 | 3·88 | 2·83 | 7 | ..... | ..... | ..... |
| 6 | 1·043 | 6·54 | 7 | 65·2 | 5·10 | 4·56 | 3·32 | 8·5 | ..... | ..... | ..... |
| 7 | 1·050 | 7·48 | 8 | 65·6 | 5·83 | 5·25 | 3·82 | 10 | ..... | ..... | ..... |
| 8 | 1·057 | 8·41 | 9 | 66·0 | 6·56 | 5·94 | 4·33 | 11·5 | ..... | ..... | ..... |
| 9 | 1·064 | 9·35 | 10 | 66·5 | 7·29 | 6·65 | 4·85 | 13 | ..... | ..... | ..... |
| 10 | 1·071 | 10·28 | 11 | 66·9 | 13·16 | 7·36 | 8·80 | 14 | ..... | ..... | 43° |
| 11 | 1·086 | 12·15 | 13 | 67·8 | 15·45 | 8·81 | 10·47 | 17 | ..... | ..... | ..... |
| 12 | 1·093 | 13·09 | 14 | 68·3 | 16·75 | 9·56 | 11·44 | 18·5 | ..... | ..... | ..... |
| 13 | 1·100 | 14·02 | 15 | 68·7 | 17·94 | 10·30 | 12·32 | 20 | 103 | 217 | ..... |
| 14 | 1·107 | 14·96 | 16 | 69·2 | 19·15 | 11·07 | 13·25 | 21·5 | ..... | ..... | ..... |
| 15 | 1·114 | 15·89 | 17 | 69·6 | 20·34 | 11·83 | 14·15 | 23 | ..... | ..... | ..... |
| 16 | 1·122 | 16·83 | 18 | 70·1 | 21·54 | 12·62 | 15·10 | 24·5 | ..... | ..... | ..... |
| 17 | 1·136 | 18·70 | 20 | 71·0 | 23·93 | 14·20 | 16·99 | 27 | ..... | ..... | ..... |
| 18 | 1·143 | 19·63 | 21 | 71·4 | 25·12 | 14·99 | 17·93 | 28·5 | ..... | ..... | ..... |
| 19 | 1·150 | 20·57 | 22 | 71·8 | 26·33 | 15·79 | 18·90 | 30 | ..... | ..... | ..... |
| 20 | 1·158 | 21·50 | 23 | 72·3 | 27·52 | 16·63 | 19·89 | 31·5 | ..... | ..... | 30° |
| 21 | 1·172 | 23·37 | 25 | 73·2 | 29·91 | 18·30 | 21·89 | 34·5 | ..... | ..... | ..... |
| 22 | 1·179 | 24·31 | 26 | 73·7 | 31·11 | 19·16 | 22·93 | 35·7 | ..... | ..... | ..... |
| 23 | 1·186 | 25·24 | 27 | 74·1 | 32·31 | 20·00 | 23·94 | 37 | ..... | ..... | ..... |
| 24 | 1·201 | 27·11 | 29 | 75·0 | 34·70 | 21·75 | 26·02 | 40 | 107 | 224 | ..... |
| 25 | 1·208 | 28·05 | 30 | 75·5 | 35·90 | 22·65 | 27·10 | 41·5 | ..... | ..... | ..... |
| 26 | 1·216 | 29·98 | 31 | 76·0 | 37·15 | 23·56 | 28·23 | 43 | ..... | ..... | ..... |
| 27 | 1·231 | 30·85 | 33 | 76·9 | 39·55 | 25·37 | 30·41 | 46 | ..... | ..... | ..... |
| 28 | 1·238 | 31·79 | 34 | 77·4 | 40·75 | 26·31 | 31·54 | 47·5 | ..... | ..... | ..... |
| 29 | 1·254 | 33.66 | 36 | 78·4 | 43·15 | 28·22 | 33·83 | 51 | ..... | ..... | ..... |
| 30 | 1·262 | 34·59 | 37 | 78·9 | 44·34 | 29·19 | 34·98 | 52·5 | ..... | ..... | 30° |
| 31 | 1·269 | 35·53 | 38 | 79·3 | 45·55 | 30·13 | 36·12 | 54 | ..... | ..... | ..... |
| 32 | 1·285 | 37·40 | 40 | 80·3 | 47·95 | 32·12 | 38·50 | 57 | ..... | ..... | ..... |
| 33 | 1·293 | 38·33 | 41 | 80·8 | 49·14 | 33·13 | 39·70 | 58·5 | 115 | 239 | ..... |
| 34 | 1·309 | 40·20 | 43 | 81·8 | 51·54 | 35·17 | 42·16 | 62 | ..... | ..... | ..... |
| 35 | 1·317 | 41·14 | 44 | 82·3 | 52·74 | 36·21 | 43·40 | 63·5 | ..... | ..... | ..... |
| 36 | 1·334 | 43.01 | 46 | 83·4 | 55·14 | 38·36 | 45·98 | 67 | ..... | ..... | ..... |
| 37 | 1·342 | 43·94 | 47 | 83·9 | 56·33 | 39·43 | 47·26 | 68·5 | ..... | ..... | ..... |
| 38 | 1·359 | 45·81 | 49 | 84·9 | 58·73 | 40·75 | 49·86 | 72 | ..... | ..... | ..... |
| 39 | 1·368 | 46·75 | 50 | 85·5 | 59·93 | 42·75 | 51·24 | 73·5 | ..... | ..... | ..... |
| 40 | 1·386 | 48·62 | 52 | 86·6 | 62·33 | 45·03 | 53·98 | 77 | ..... | ..... | 31° |
| 41 | 1·395 | 49·55 | 53 | 87·2 | 63·52 | 46·21 | 55·39 | 79 | ..... | ..... | ..... |
| 42 | 1·413 | 51·42 | 55 | 88·3 | 65·92 | 48·56 | 58·21 | 82·5 | 128 | 262 | ..... |
| 43 | 1·422 | 52·36 | 56 | 88·9 | 67·12 | 49·78 | 59·67 | 84·5 | ..... | ..... | ..... |
| 44 | 1·441 | 54·23 | 58 | 90·0 | 69·53 | 52·20 | 62·57 | 88 | ..... | ..... | ..... |
| 45 | 1·451 | 55·16 | 59 | 90·7 | 70·71 | 53·51 | 64·13 | 90 | ..... | ..... | ..... |
| 46 | 1·470 | 57·03 | 61 | 91·9 | 73·11 | 56·06 | 67·19 | 94 | ..... | ..... | ..... |
| 47 | 1·480 | 57·97 | 62 | 92·5 | 74·32 | 57·35 | 68·74 | 96 | ..... | ..... | ..... |
| 48 | 1·500 | 59·84 | 64 | 93·7 | 76·71 | 59·97 | 71·88 | 100 | ..... | ..... | ..... |
| 49 | 1·510 | 60·77 | 65 | 94·4 | 77·91 | 61·36 | 73·55 | 102 | ..... | ..... | ..... |
| 50 | 1·531 | 62·64 | 67 | 95·7 | 80·31 | 64·12 | 76·85 | 106 | 144 | 292 | 38° |
| 51 | 1·541 | 63·58 | 68 | 96·3 | 81·51 | 65·48 | 78·49 | 108 | ..... | ..... | ..... |
| 52 | 1·562 | 65·45 | 70 | 97·6 | 83·91 | 68·32 | 81·89 | 112·5 | ..... | ..... | ..... |
| 53 | 1·573 | 66·38 | 71 | 98·3 | 85·10 | 69·69 | 83·65 | 114·5 | ..... | ..... | ..... |
| 54 | 1·594 | 68·25 | 73 | 99·6 | 87·50 | 72·71 | 87·15 | 119 | ..... | ..... | ..... |
| 55 | 1·616 | 70·12 | 75 | 101·0 | 89·89 | 76·05 | 90·79 | 123 | ..... | ..... | ..... |
| 56 | 1·627 | 71·06 | 76 | 101·7 | 91·10 | 77·29 | 92·65 | 125·5 | ..... | ..... | ..... |
| 57 | 1·650 | 72·93 | 78 | 103·1 | 93·50 | 80·42 | 96·40 | 130 | 177 | 350 | ..... |
| 58 | 1·661 | 73·86 | 79 | 103·8 | 94·69 | 82·00 | 98·29 | 132 | 180 | 354 | ..... |
| 59 | 1·683 | 75·73 | 81 | 105·2 | 97·08 | 85·21 | 102·13 | 136·5 | 186 | 367 | ..... |
| 60 | 1·705 | 77·60 | 83 | 106·5 | 100·00 | 88·39 | 106·50 | 141 | 192 | 378 | 40° |
| 61 | 1·727 | 79·47 | 85 | 107·9 | 101·88 | 91·71 | 109·93 | 145·5 | 200 | 392 | ..... |
| 62 | 1·747 | 81·34 | 87 | 109·2 | 104·28 | 95·00 | 113·87 | 149·5 | 205 | 401 | ..... |
| 63 | 1·767 | 83·21 | 89 | 110·4 | 106·68 | 98·25 | 117·77 | 153·5 | 217 | 422 | ..... |
| 64 | 1·793 | 86·02 | 92 | 112·0 | 110·28 | 103·04 | 123·51 | 158·5 | 230 | 446 | ..... |
| 65 | 1·814 | 88·82 | 95 | 113·4 | 113·87 | 107·73 | 129·13 | 163 | 249 | 480 | ..... |
| 66 | 1·835 | 93·50 | 100 | 114·7 | 119·87 | 114·70 | 137·49 | 167 | 272 | 523 | 40° |

# Official Memoranda.

FROM THE BOARD OF TRADE JOURNAL.

Italian Mining.—P. Toso, engineer in the Royal School of Mines has reported on the mine of Valle Imperina. The writer believes that the importance of the mine is likely to be greatly increased by the extension of the railway from Treviso to Belluno. In particular, he suggests the sale of material which is now wasted for the manufacture of sulphuric acid in Venice, Tuscany, Bavaria, and elsewhere. The Consul-General states that it is the intention of the Italian Government to dispose of the mine and to give every inducement to its becoming a private undertaking.

Fines in the Russian Customs.—It appears that dishonest clearing agents are charging as though these had been really exacted. It is therefore advisable that in all cases agents should be called upon to produce the official receipt for fines stated by them to have been paid.

Russian Customs Regulations.—The following decisions affecting the classification of articles in the Russian Customs Tariff have recently been given by the Government:—

The poud is 36lb. avoirdupois; the gold rouble 3s. 2d.

Fluor spar, duty 4 copecks per poud.

Apparatus of alloys of zinc and antimony, duty 88 copecks per poud, with an addition of 20 per cent. on each rouble of duty levied.

Roasted beetroot, in small pieces, 40 copecks per poud, with an addition of 20 per cent. on each rouble leviable.

Norwegian Tobacco Duties.—These have been increased, and the operation will, it is estimated, yield an additional revenue of about £50,000 per annum. The increase in the duties on tobacco amounts to 40 per cent., except in the case of cigars and cigarettes, which have only been raised to the extent of 31 per cent.

French Customs Tariff.—Some changes have been made in the Customs duties in France on the importation of various chemical articles. Madder, sumac, fustic, gallnuts, and acorn cups are admitted free, boracic acid is admitted free, millstones admitted free, potash and carbonate of potash, if of European production, free if imported direct, if otherwise imported 2·4 francs per 100 kilos. Sulphate of quinine is charged 5 per cent. *ad valorem*, and most chemical products, not specially mentioned in the tariff, 5 per cent. *ad valorem*. Ochres, ground or prepared for painting, are admitted at a duty of ·25 francs per 100 kilos. Italian sienna and umber 50 centimes per 100 kilos. Pulverised talc 25 centimes per 100 kilos. Glass slabs the import duty of 4·75 francs per 100 kilos, while if it is in beads pierced or cut, or in crystals for jewellery, the import duty charged is 25 francs per 100 kilos.

Swiss Customs Tariff.—Ammoniacal sulphate of copper for use in destroying mildew is charged a duty of 30 centimes per quintal, the quintal being 220·4lb. avoirdupois. Asphalted cardboard is taken out of category 805 and included in category 268, the import duty now being 5 francs per quintal.

Madagascar Customs Tariff.—Treaties concluded with the Hova Government fix the duties to be collected on imports into, and exports from Madagascar, at a maximum of 10 per cent. *ad valorem*. For a certain number of articles, however, the duty of 10 per cent. *ad valorem* has been temporarily replaced by specific duties as follows:—Bones, 50 centimes per 100 kilos.; wax, 20 francs per 100 kilos.; gum copal, 12 francs per 100 kilos.; horns, 75 centimes per hundred; caoutchouc, 12 francs per 100 kilos.; tallow 6 francs per 100 kilos.

Italian Customs Tariff.—Gasometers and their accessories; apparatus for heating, distilling, and refining are, as a rule, charged 20 lire per 100 kilos., but scientific apparatus, optical, chemical, physical and surgical instruments pay a varying duty of from 30 lire to 125 lire per 100 kilos.

Our Spanish Trade.—In January, 1888, the quantity of copper ore and regulus imported from Spain was 4,810 tons, as against 3,021 tons in 1887; the value is very much different, being only £63,746 in January, 1887, and £111,738 in January, 1888. The value of unenumerated chemical products imported into this country from Spain was £4,713 in January, 1887, and £4,380 in January, 1888. Iron and copper pyrites in January, 1887, to 54,122 tons, and in January, 1888, to 55,117 tons, the value of this quantity being £102,814 in January, 1887, and £94,967 in January, 1888. The value of the quicksilver imported in January, 1887, was £58,500, and in January, 1888, £102,798; the zinc ore imported in January, 1887, was £600, and £606 in January, 1888. The alkali exports have diminished from 20,501 cwts. in January, 1887, to 17,860 cwts. in January, 1888, and the value has fallen from £7,627 in January, 1887, to £5,000 in January, 1888; the exports of cement have risen from £449 in January, 1887, to £3,643 in January, 1888. The exports of coal products, including naphtha, paraffin, and petroleum, have fallen off from £3,135 in January, 1887, to £1,650 in January, 1888; the exports of manure have wonderfully increased from £2,486 in January, 1887, to £17,857 in January, 1888. The export of soap has fallen off from £251 in January, 1887, to £185 in January, 1888.

Lard made from Cottonseed Oil.—A Bill is now before the Senate for regulating the sale of adulterated lard, that is to say, lard made from cottonseed oil, it being the intention of the Senate to impose a tax of one cent per lb. The cotton-growing States have memorialised Congress against this measure. They assert that the imposition of such a tax will practically destroy the manufacture of cottonseed oil, render worthless the mills in which millions of dollars have been invested, throw out of employment thousands of labourers, and eventually in driving from the markets of the world one of the chief products of the United States. The extent to which cottonseed oil is used as an adulterant of lard is admitted by those who use it. A firm in Galveston (Texas) has admitted that they alone consumed one-fifth, or from 3,000,000 to 3,500,000 gallons yearly in the manufacture of lard, and that the firm made and sold last year 60,000,000lb. of so-called refined lard, of which only 60 per cent. was lard.

Trade in Explosives in France.—The following particulars of the import, export, and production of explosives in France in 1885 and 1886 have been furnished to Mr. J. A. Crowe, Her Majesty's Commercial Attaché for Europe, by the Directors of Commerce and Indirect Taxes, and are contained in his report dated the 13th February last:—

"As regards imports, we should remember that gunpowder, gun-cotton, nitro-glycerine, picrate, and fulminate, are all prohibited, that dynamite is allowed to enter at a duty of 2 francs 50 centimes per kilog., under special regulations; and that loaded cartridges are admitted, under special arrangements, at a duty of 25 francs per 100 kilos.

"The import of dynamite and loaded cartridges into France in 1886 were as follows:—From Belgium, 68,605 kilos. of dynamite, and cartridges, *nil*; from England, dynamite, *nil*, and 133 kilos. of cartridges; from Italy, dynamite, *nil*, and 18 kilos. of cartridges; from Switzerland, dynamite, *nil*, and 1,458 kilos. of cartridges; giving totals of 68,605 kilos. of dynamite, and 1,609 kilos of cartridges.

"Belgium is the sole importer of dynamite.

"The exports of explosives have been as follows;—Military powder, 994 kilos. in 1886, and *nil* in 1885; sporting powder, 30,018 kilos. and 13,924 kilos.; mining and foreign trade powder, 833,164 kilos. and 817,779 kilos.

"The production of dynamite and gunpowder is controlled by the Excise, and official returns show the sales to have been as follows:—Sporting powder, 433,518 kilos. in 1886 and 490,562 kilos. in 1885; mining powder, 2,559,128 kilos. and 2,815,258 kilos.; military powder, 164,286 kilos. and 171,888 kilos.; powders sold of all kinds on the Swiss and Italian frontier-districts of Corsica, Monaco, and Tunisia, 148,967 kilos. and 100,193 kilos.; dynamite, 396,618 kilos. and 447,359 kilos.; nitro-glycerine, 668 kilos. and 774 kilos.

"The total amount of gunpowder that paid Excise was 4,169,081 kilos. in 1886 and 4,409,604 kilos. in 1885.

"The Excise on gunpowder gave 12,970,255 francs (£518,808) in 1886, as against 13,862,441 francs (£554,496) in 1885."

Laws for the Suppression of Frauds in the Manure Trade in Belgium.—The *Moniteur Belge* for the 7th February last, publishes the text of two laws for the suppression of frauds in the manure trade in Belgium, which have recently been adopted by the Belgian Chambers, and received the Royal sanction on the 29th and 30th of January respectively. The first of these laws enumerates the steps to be taken by vendors of manures other than natural manures, the penalties to be imposed in case of infraction of the law, etc. The second law gives the designations to be adopted by sellers of manures, in making out invoices, etc.

ESTABLISHMENT OF A PERMANENT COMMERCIAL MUSEUM IN THE ARGENTINE REPUBLIC.—The *Economiste Français* for the 11th February last, states that the Government of the Argentine Republic, in order to develop the resources of that country, has published a decree organising a permanent commercial museum of the natural and industrial products of the Republic. To the museum it is proposed to attach a sort of statistical bureau, recording all facts connected with wages, freights, prices, etc.

ANTIMONY IN TURKEY.—The Belgian *Bulletin du Musée Commercial* for the 18th February, quotes from the *Journal de la Chambre de Commerce de Constantinople* the statement that M. Miltiades Constantinidis, who is the proprietor of a mine of antimony in the island of Samos, is receiving offers from various capitalists with a view to the working of this mine. The latter is said to be very rich, and a certain quantity of the ore, lately examined, produced from 58 to 60 per cent. of antimony.

LEAD MINES IN TURKEY.—The following information respecting concessions for lead mines recently made by the Turkish Government is extracted from the *Moniteur des Intérêts Matériels* for the 19th Februry last:—

A firman of the 20th December last, approves the concession, granted to Mr. Belper, an Englishman, of a mine of argentiferous lead, situated at Peikova, Avret-Hissar district of the vilayet of Salonica.

The concession is for 99 years; the extent of the mine 4,990 deunums. The grantee will pay to the Treasury annually 5 paras gold (the para being equivalent to $\frac{7}{18}$d.) per deunum (deunum = 40 sq. paces), about 623 piastres 30 paras in gold. Further, the grantee will cede to the State 5 per cent. of argentiferous lead ore extracted.

The grantee must, besides, deposit £200 gold, once for all, for the cost of the firman.

Mining operations must commence within a year from the date of the firman.

Three other fimans, also dated the 20th December, grant to Mr. Belper, on similar conditions, the following concessions:—

Of the argentiferous lead mine at Bal-Oghoulari and Gumuch-Déré, in the district of Avret-Hissar in the vilayet of Salonica, of an extent of 13,850.

Of the copper and argentiferous lead mines of Fenerli and Rayan, district of Avret-Hissar in the vilayet of Salonica, extending 9,740 deunums.

Of the argentiferous lead mines of Païrat, district of Kebileketch in the vilayet of Salonica, and of an extent of 12,635 deunums.

Another important concession has just been granted to Messrs. G. Coronio, J. Azarian, and A. Azarian, for the argentiferous lead mines of Boulgar Dagh.

The extent of the concession is 7,200 hectares; limit 50 years.

The rent to the Government is 12½ per cent. of the lead turned over, delivered at Mersine, free of all charges.

The grantees, or the society which will take over their rights, will not have to pay any tax or imposts of any description. They will be entitled to free importations during the time of the concession of materials and machines coming from abroad and intended for use in the mines.

From the 1st January, 1891, the extraction should be, at the lowest, 5,000 tons per annum.

TRINIDAD PITCH LAKE.—The following memorandum on the Trinidad Pitch Lake has been received from the Colonial Office for publication in the *Board of Trade Journal*:—

A very important question in connection with this valuable property has been decided by the Government of Trinidad, in accordance with the opinion of the Legislative Council of the Colony, to whom it was referred by direction of the Secretary of State for the Colonies, viz., whether the Government should exercise its right to throw open a lot of five acres (which was reserved when the existing leases for all the other lots of the lake were granted), and grant licenses to win pitch therefrom, or accept an offer made by the leaseholders of all the other lots for a grant of the entire lake for a period of twenty-one years.

The proposal made by Messrs. Barber and Greig, representing large interests both in the United States of America and in this country, on behalf of the present leaseholders was shortly as follows. They asked:—

1st. That the Colonial Government should grant them the exclusive right to win pitch from the lake for the fixed term of twenty-one years.

2nd. That the Government should levy an export duty of 6s. 8d. per ton on raw asphalt, and 10s. per ton on epurée, on all asphalt exported from the Colony.

3rd. That the Government should grant permission to lay down tramways and erect piers for facilitating the transportation and shipping of the pitch.

In consideration of the above concessions they offered:—

1st. To pay yearly in advance the sum of £10,000, which was to be taken as covering the export duty on a minimum output of 30,000 tons.

2nd. To pay export duty at the rates mentioned above on all asphalt exported by them in excess of the said 30,000 tons.

3rd. To surrender at once their existing leases, and thereby place the entire lake under the control of the Government at the end of the present grant, or immediately in case of default by them in any of the terms of the grant.

This was the offer of the present leaseholders and their supporters, who claimed to be entitled to the entire credit of developing the existing trade in Trinidad asphalt. As against this proposal there was no other definite offer sent in, nor were any data forthcoming to show what revenue might be expected to accrue to the Colonial Government if the five acre lot was thrown open to licences.

LAW FOR THE SUPPRESSION OF FRAUDS IN THE MANURE TRADE IN FRANCE.—The French *Journal Officiel* for the 17th February last, publishes the text of a law for the suppression of frauds in the manure trade in France, which has recently been passed by the French Chambers, and received the President's sanction on the 7th February. The law provides that those persons who, in selling or exhibiting for sale manures, shall have deceived or attempted to deceive the purchaser, either as to their nature, composition, or quantitative analysis of the useful elements which they contain, or as to origin or use, or by designating or qualifying them with a name which is usually given to other fertilising substances, will be punished with imprisonment of from six days to one month, and with a fine of from 50 to 2,000 francs, or one of those penalties only. The law contains further provisions as to repetitions of offences, conditions of sale, classification of manures, etc.

THE PHYLLOXERA IN FRANCE.—The loss occasioned by the phylloxera amongst the vines in France may be taken at a sum exceeding 10,000,000,000 frs. or £400,000,000. Such is approximately the damage wrought by the phylloxera in France. It is certainly the greatest cause of agricultural, industrial, and commercial distress which has been experienced in France for many years past, and which has necessarily resulted in a decrease of railway receipts and a diminution of our financial strength.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

X. Y. Z.—We shall be pleased to receive the article you name.

Z. Z.—In our next.

C. C. H.—An article on the subject will appear before long. We are collecting material for it.

H. D.—Yes, it shows a very mean spirit; but it is only what you may expect from men who are always making a parade of their benevolent actions.

CHEMIST.—You will get all the information you require in Gmelin's Handbook. Yes, Rose's analysis.

REFINER.—The business is not a profitable one at the present time.

PAPER MAKER.—It is a matter of business.

H. C.—Send us the sample and we will give you our opinion upon it.

A. B.—Every year brings us fresh political cries from those anxious to soar into notoriety. Technical education is one of these, and is being used pretty well as a platform for personal advancement.

FINISHER.—We do not know of any such waste substance as you mention.

T. H.—The Legislature has created its own difficulty in the matter; but the ratepayers will have eventually to grumble and pay

RUSSIAN PETROLEUM IN INDIA.—The *Odessa Messenger* states that India is becoming one of the largest consumers of Russian petroleum in the world. In 1887 more than 2,000,000 pouds were exported from Batoum for that destination, and in January alone of the present year, as much as 400,000 pouds were shipped at that port for the East Indies.

# Trade Notes.

SEWAGE, RAINFALL, AND FARMING.—The report of the Walsall Borough Surveyor for the year ended September 30 last shows that the total length of sewers (exclusive of those within the Bloxwich district) was 35 miles 6 furlongs 130 yards, 3 miles and 16 yards having been constructed during the year. The total length in the Bloxwich district was 1 mile 4 furlongs 176 yards, of which 2 furlongs 174 yards were constructed during the year. The sewers varied in size from 6 inches in diameter to 4 feet 6 inches, and with few exceptions were in a good state of repair and working order. The purification of the sewage at the farm had been well and efficiently carried out; and the number of gallons pumped by the turbine was 95,018,470, as against 103,405,554, the decrease being attributed to the exceptional dryness of the summer, and the consequent deficient supply of water for the working of the turbine to advantage. The rainfall during the year was 27·67 inches, a decrease as compared with the previous year of 7·56 inches.

FALL INTO A CHEMICAL VAT.—At the Hebburn Police Court, last week, Robert Campbell, a middle-aged man, who was brought from the cells shivering, and holding in their place a pair of ill-fitting drawers, was charged with being drunk and disorderly.—Patrick Walsh, a watchman employed at Tennant's chemical works, said that about one o'clock on Sunday morning he found the defendant in the soda house of the works. He was drunk, and witness requested him to leave the premises; but he refused to do so, and became very violent, and struck witness, who had to eject him by force.—Sergeant Hildreth stated that the defendant had fallen into one of the soda vats in the chemical works. When he was brought to the police station they had to take his clothes off him, and "they were all so stiff that they would stand by themselves." He remained naked in the cells for some time, and they had to beg the clothes which he now wore from pawnbrokers and others in Hebburn.—Mr. W. H. Richardson (from the Bench): You seem to have run a very great risk of your life.—Defendant: Yes, sir. I am thankful to the officers for what they have done to me. If it had not been for them I would not have been alive now. I have never been in the same state before, and I hope to God I shall never be again.—The Bench thought defendant had been sufficiently punished and discharged him.

THAMES WATER: WHENCE?—Mr. Labouchere, in seconding the rejection of the Grand Junction Water Bill, is reported to have made this observation, that the promoters of the Bill assumed that the members of the House of Commons "supposed the Thames depended wholly for its supply upon the rains from heaven." It would be most interesting to know, then, from what other source they suppose Father Thames to be supplied. If there be one drop in his bed that did not come down with the rains from heaven, it should be bottled and shown round.

LONDON PRODUCE CLEARING HOUSE.—The coffee and cocoa section of the London Chamber of Commerce held an adjourned meeting yesterday to consider the proposal to establish a bank *caisse de liquidation*, under the title of the London Produce Clearing House. There was a strong feeling both for and against the project, and ultimately it was decided to adjourn the meeting for six months, that it might be seen how the clearing house would get on.

THE RIOTS IN RIO TINTO.—The *Official Gazette* has published a decree suppressing gradually all open-air calcinations at the Rio Tinto Mines in Spain. The decree requires that from the 1st January, 1889, all open-air calcinations shall be reduced by one-fourth; from the beginning of 1890 by one-half, and that from the beginning of 1891 these shall cease altogether. As a compensation for the loss which shall be sustained by the large mining companies at Rio Tinto owing to this decree, the Government proposes to reduce their taxes and Custom House duties to a large extent.

MERCURIAL POISONING.—The *Chemical Journal* of Nürenburg relates a case of all the workpeople engaged in the melting department of a factory there becoming ill under all the symptoms of chronic mercurialism. Analysis showed that the tin employed was the cause of the mercurial poisoning, for it contained 1·3 per cent. of quicksilver. All the blocks of tin in a considerable stock showed an equal quantity of that metal. These blocks of tin all bore the well-known trade mark "Lamm" upon them, and the stamp of the firm of S. A. Stone and Son, Meltwell. It is a remarkable circumstance to find so considerable a quantity of quicksilver in tin—provided it is not accounted for by supposing that tinfoil, perhaps emanating from a looking-glass factory, where the tin used is always accompanied with quicksilver, has been cast into blocks, in order to take advantage of the present high prices, and brought into the market by some unauthorised persons under a celebrated trade mark in a fraudulent manner. The law courts are instituting an inquiry into the matter.

CEMENT.—In the House of Commons last week, Mr. Murphy asked the Secretary of State for War, whether, although cement for War Department works was supplied subject to conditions to comply with certain tests, it was as a matter of fact constantly used without the specified tests being actually carried out, the character of the manufacturer, with, perhaps, occasional tests, being considered a sufficient guarantee; whether he was aware that, with this knowledge, builders preferred buying from well-known rather than newly-established makers; and whether, with a view to encouraging a struggling effort to establish cement manufacture in Ireland, he would direct the Engineer Department in Dublin to have some tests made of Irish cement in the presence of the manufacturers' agents.—Mr. Brodrick: The facts are, no doubt, as stated in the hon. member's question. The War Department does not desire to fetter in any way a contractor's discretion as to where he procures his cement, and it would therefore be contrary to the rule to test any cement except that which the contractor tenders for actual use.

STENCH.—In our towns and villages, right in the middle of streets, may often be seen gratings, from which are spewed forth the concentrated fumes of the sewers, poisonous exhalations, mephitic vapours, vile and stinking as ever was deadly discharge from "grim Albumean deep." It is truly an abomination—these sewer gratings. It is especially so where the tide dams the sewage back, driving the steaming stench up the noses of man and beast as if by a force pump. Now a Mr. Keeling has invented a Sewer Gas Destroyer, by which he says he can destroy all organic particles and deleterious gases before they are suffered to escape into the atmosphere. More power, we say, to Mr. Keeling's elbow!

CHLORIDE OF POTASSIUM INDUSTRY.—The salt works belonging to the Carnellite output union which expires at the end of this year have agreed, in order to make a new treaty of a similar nature possible, to abandon all sales of salts of all kinds until the 30th of June of this year, including the production for delivery in the period from July to December, 1888. The works also bind themselves to have nothing to do with any measure previous to the 30th of June which could disturb the condition of the market. The potassium chloride factories have joined in this treaty.—*Kuhlow's.*

A COAL-SEAM ON FIRE.—Some alarm has been caused at the works of Messrs. W. H. Harrison and Company, silver-platers, Sheffield, by the discovery that a bed of coal lying near the surface underneath the boiler has become ignited. The boiler is sunk a little below the level of the works yard. It was placed in position five years ago, and has been in constant use ever since. A few days ago, it became necessary to make some alteration in the boiler-flues. A man named Lingard, who was engaged to do the work, on excavating near the firing-place below the boiler, discovered that heat was given out from some other source than the boiler furnace. Examination showed that a few inches below the boiler bed was a seam of coal, which had become heated, and a good deal of the coal was red-hot.

ELECTRICITY IN TOWNS.—Electric lighting seems to have been solved in Taunton. The town has been lit for above a year by a local electric light company, which lets to other than the town authorities 20 arc and 200 incandescent lamps. For the past year a dividend of 5 per cent. per annum is paid, and a small balance carried forward. The system in use is the same as that employed at St. Pancras Railway Station. For town purposes, electricity seems now likely to make advances.

MANUFACTURE OF LACQUER.—An improvement has lately been taking place in the lacquer industry. A few unfavourable conditions still continue, namely, the great length of credit customary in the trade, and the lowness of prices, but in respect of public tenders a change has been effected. Contracts are no longer adjudicated to the lowest tender. Better prices are paid, and the lacquer purveyors are thus enabled to obtain a greater profit upon their products.—*Kuhlow's.*

THE INSPECTION OF HIDES.—In answer to a question by Mr. Howell, in the House of Commons, Mr. Stanhope said every effort would be made to secure thorough efficiency in the inspection of the hides sent in to the Ordnance Store Department at Woolwich. Mr. Bradlaugh asked if any steps were now being taken to guard against the adulteration of leather by a new adulterant, instead of glucose, which added nearly double the weight? Mr. Stanhope said this was a new point, and he asked for information. Mr. Bradlaugh said he would give it, and would also furnish a sample.

WATER SUPPLY OF LARGE TOWNS.—We are requested to give publicity to the following notification, which has been issued in French by His Majesty the King of the Belgians:—

By a decree dated December 14, 1874, His Majesty the King of the Belgians instituted an annual prize of 25,000f. for the encouragement of the works of the intelligence.

The prize forming the object of international competition in 1893 will be awarded to the best work on the means of procuring abundant and cheap drinking water of the best quality for large towns, and in particular for Brussels and its suburbs, regard being had to the anticipated growth of population. *(Sur la manière de procurer abondamment et au moindre prix aux grandes villes, et spécialement à l'agglomération Bruxelloise, la meilleure qualité d'eau potable, en tenant compte de l'augmentation prévue du nombre des habitants.)*

Both manuscript and printed essays will be admitted to the competition.

A new edition of a printed work cannot take part in the competition unless it contains considerable changes and additions which have appeared, like the other competing essays, within the period of the competition—namely, in one of the years 1889 to 1892 inclusive.

The essays may be written in any one of the following languages—French, Flemish, English, German, Italian, and Spanish.

Those who desire to take part in the competition must send their essays, written or printed, before January 1, 1893, to the Minister of Agriculture, Industry, and Public Works, Brussels.

The essay which obtains the prize must be printed in the course of the year following that in which the prize is awarded.

The award of the competition will be conducted by a jury named by His Majesty the King of the Belgians, and consisting of seven members, three Belgian, and the remainder foreigners of different nationalities.

REFRIGERATORS, LEAD POISON, ETC.—The Paris Board of Health *(le Conseil d'Hygiène de la Seine)* has forbidden market stall-keepers and retail dealers generally to use refrigerators, butteries, or other contrivances for preserving eatables, when the said contrivances are made of lead, or any alloy of lead; also when they are lined with zinc or other sheets joined together by plumber's solder. It also ordered that the refrigerators be washed out daily, and that nothing be put within them until they be perfectly dry. There is a lesson here for those who have betaken themselves to the good and economic custom of having refrigerators in private English houses.

FRENCH BRANDY.—The French Chamber of Deputies has, by a majority, decided on abolishing the privilege enjoyed by vine and apple growers of distilling brandy from their own produce, free of duty. A proviso is to be added, fixing a certain quantity which may be distilled for home consumption. This decision is likely to lead to illicit distillation on a large scale.

AFGHAN MINERS.—The Ameer of Afghanistan, having explorers on this side of him and on that, is touched not only with the military ambition of his European neighbours, and with a desire to make show above ground, but also with a desire to get at all that is worth having under ground. Accordingly, the news is that Mr. Griesbach, who acted as geologist to the Afghan Boundary Commission, has been permitted by the Indian Government to take employment under the Ameer, for the purpose of developing the mineral resources of Afghanistan.

EXPORTS OF COAL, CINDERS, AND PATENT FUEL.—Sir H. Hussey Vivian gave notice in the House of Commons that he would move for a return of the quantities of coals, cinders, and patent fuel shipped at the several ports of England, Scotland, and Ireland coastwise to other ports of the United Kingdom in the year 1887; of the quantities and declared value of coals, cinders, and patent fual exported from the several ports of England, Scotland and Ireland to foreign countries, and the British settlements abroad in the year 1887, distinguishing the countries to which the same were sent; of the quantities of coals, cinders, and patent fuel exported from the United Kingdom in the year 1887; of the quantities of coals and patent fuel brought coastways by inland navigation and by railway into the port of London during the year 1887; and of the quantities of coal and patent fuel received coastways at the various ports of the United Kingdom.

## GERMAN SUGAR STATISTICS.

| | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 | 1877 | 1878 | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tons of Beet per acre ..... | 8·1 | 10·2 | 10·9 | 8·3 | 11·3 | 10·1 | 11·0 | 11·6 | 10·1 | 13·1 | 11·8 | 13·8 | 11·9 | 11·3 |
| Production of Sugar.....Tons | 186,441 | 262,551 | 291,041 | 256,412 | 358,048 | 289,422 | 378,009 | 426,155 | 409,415 | 555,915 | 644,775 | 848,124 | 986,402 | 1,154,417 |
| Percentage Diffusion works..... | 16·7 | 19·5 | 23·7 | 34·0 | 47·3 | 60·0 | 68·0 | 80·0 | 88·7 | 90·3 | 94·0 | 94·0 | 95·5 | 96·0 |
| Tons Sugar per 100 tons Beet... | 8·28 | 8·26 | 8·25 | 9·30 | 8·60 | 8·15 | 9·24 | 9·21 | 8·52 | 8·79 | 9·56 | 9·55 | 10·54 | 10·3 |
| Tons Beet for one ton Sugar... | 12·07 | 12·11 | 12·12 | 10·75 | 11·60 | 12·47 | 10·82 | 10·86 | 11·74 | 11·37 | 10·46 | 10·47 | 9·42 | 9·70 |
| Tons Sugar per acre ..... | 0·67 | 0·84 | 0·90 | 0·97 | 0·97 | 0·82 | 1·02 | 1·07 | 0·86 | 1·15 | 1·32 | 1·35 | 1·25 | 1·16 |

The figures show that the yield of sugar per acre in 1882 was double that in 1871.

COAL AT £5 A TON.—The terrible weather prevailing in Russia, where such a severe winter has not been known for a century, has led to a coal famine at Odessa. For weeks some of the lines usually transmitting coal to that port have been in a more or less blocked condition, and in consequence of the lowness of the stocks of fuel the price of coal a week ago reached £5 a ton. This, of course, meant no fires at all for the poor, and the Municipal Government had to distribute fuel at its own cost, and urge the Imperial authorities to send special trains with coal from the Donetz region.

AMERICAN CHEESE.—In the House of Commons last week Mr. W. M'Laren asked the Chancellor of the Duchy of Lancaster whether his attention had been called to the large admixture of animal fat in the manufacture of American cheese, which enabled the latter to be sold in this country as pure cheese at such prices as were injurious to the manufacture of pure cheese, and whether he would instruct our American Consuls to inquire into and report upon the extent of this admixture in order to give some reliable facts about it to the British public.—Mr. Long: The attention of the Agricultural Department has been called to this matter. The Departmental Statistical Inquiry Committee which met in 1882 made some inquiry into the use of oleomargarine and lard in the manufacture of cheese in the United States, and the evidence of Dr. Voelcker was taken on the subject. The Foreign Office has been asked to obtain reports from Consular officers in the United States as to the prevalence of this adulteration in the manufacture of cheese.

THE DOTY LIGHT.—A demonstration of this light took place recently at Messrs. F. Braby and Co.'s works at Deptford, where two lights were shown sufficient to illuminate a workshop 200 feet by 40 feet. The "Doty" light consists of a galvanised iron cylinder two feet high and 18 inches in diameter, containing a supply of creosote, paraffin oil, or other suitable material. Pressure is brought on to the top of the oil by means of an air pump, whereby the oil is forced through the coil surrounding the lower portion of the flame and becomes distilled into gas. We do not know how this coil is cleaned out when choked with carbon.

THE ADULTERATION OF BEER.—In answer to a question put by Mr. O. V. Morgan, in the House of Commons, the Chancellor of the Exchequer said—During the year ended the 31st of December, 1887, 297 publicans were fined by magistrates for the dilution or other adulteration of beer, and in 21 cases the full penalty of £50 was paid to avoid going into Court.

THE SEAHAM HARBOUR CHEMICAL WORKS.—Amongst the new local companies registered at Somerset House this week is the Seaham Chemical Works, with a capital of £20,000. The objects are to acquire the property formerly used by Watson, Kipling, and Company as chemical works at Seaham Harbour, for the purpose of carrying on the said works and business of chemical manufacturers. The first subscribers are:—John Spencer, Whorlton Hall, Newcastle, steel manufacturer; Michael Spencer, Walbottle Hall, steel manufacturer; Thomas Spencer, The Grove, Ryton; John Spencer, Newcastle, merchant; Thomas Lomas, Seaham Harbour, chemical manufacturer; Henry W. E. Spencer, Seaham Harbour, book-keeper; J. Frederick Spencer, Newcastle, merchant's clerk. In the first instance, Messrs. John Spencer, Michael Spencer, Thos. Spencer, John Spencer, and T. Lomas are the directors. Mr. T. Lomas is first managing director.

A TERRIBLE DANGER IN REFUSE HEAPS.—It is feared that two boys, named Ralph Cummings and Samuel White, about fourteen or fifteen years of age, have been engulfed and burned to death in a cinder heap at the Darlington Steelworks. Five boys were during Tuesday afternoon on the cinder heap, which is always on fire underneath the surface. Three of them say they suddenly saw a cloud of dust and smoke, and missed two of their companions. Strangely enough, they said nothing about it till the evening, when there was found a cavity of 10ft, where White and Cummings were supposed to have disappeared. The manager of the steelworks immediately set the men to dig, but they had to be withdrawn because of the heat and danger from the treacherous cinder heap, which gradually burns away and sinks in. An iron bar, pushed down 18ft., when withdrawn was found to be red hot. The general belief entertained in the locality is that the boys have been suddenly swallowed up and burned, and it seems doubtful whether any traces of them will be discovered if such be the case.

## THE ACTION OF SULPHUROUS VAPOURS ON PLANTS.

THE following conclusions were arrived at as the result of the elaborate series of experiments performed by the late Professor E. Morren, and published in the *Belgique Horticole* after the death of the author :—

Leaves are more sensitive to the action of sulphurous acid than flowers. A proportion of sulphurous acid gas, sufficient to affect the leaves, has no appreciable effect on the flowers. A proportion of 1-80,000 to 1-90,000 part of sulphurous acid gas is sufficient to cause great pathological alterations on the leaves of fruit trees; 1-80,000 of sulphurous acid in the air will affect the apple; but one part of gas in 10,000 of air produces no results. The changes produced by sulphurous acid gas on leaves seem to spread after the gas has directly ceased to act. The prejudicial effect of sulphurous acid gas on the leaves is shown by the appearance of yellowish-brown and irregular specks. These are particularly noticeable at the tips and edges of the leaves, and extend over the cellular part of the leaf. The nerves are least affected, and usually remain green. Adult leaves are usually more sensitive to the action of sulphurous acid than are young leaves that have not attained their complete development. The alteration begins by the formation of dull greenish-white spots, situated between the nerves and on the edge of leaves; these spots, which spread a little, turn green, then rusty-brown. At length the dead tissues are destroyed, and the leaves are perforated and torn. The action of sulphurous acid gas (a proportion of 1-80,000) is evident in a very short time, usually in three to five hours.

Sulphurous acid gas dissolved in water, and placed on either of the surfaces of the leaf, is almost without effect on the upper, while on the lower surface, each little drop causes the formation of a spot of greenish-brown discolouration visible on both surfaces. It is proved from experiments concerning the comparative effect of sulphuric acid and sulphurous acid dissolved in water, that this gas by its contact with the vapour of water and the oxygen of the air is not changed, at least not rapidly, into sulphuric acid. Each of these two acids has a distinctly different effect. The action of sulphurous acid as a solution or in a gaseous state is as potent by night as by day. All the sources of sulphurous acid—and these are numerous—effect the vegetation in the neighbourhood. Near certain industrial establishments which use sulphur, or which consume pyretic fuel, the vapours spread death around them. The action is unvarying; wherever a furnace is used and a chimney is raised, this result is noticeable. We speak of Belgium, where coal of more or less pyretic character is usually burnt. The smallest chimney isolated in the country influences the foliage near it, and with a little experience we can easily pick the leaves showing the effects of sulphurous acid.

## PRICE'S PATENT CANDLE COMPANY LIMITED.

THE forty-first annual meeting of the shareholders of Price's Patent Candle Company Limited, was held at the Cannon-street Hotel, London, last week, Mr. Thomas C. Wright presiding.

The chairman, in moving the adoption of the report, said that during 1887 the volume of trade was larger than in the previous year. The Bromborough refinery on the Mersey had been so far completed as to admit of operations being carried on there, and was working well and economically. When finished it would make an important addition to the power of the factory, and its cost would not exceed the original estimate of £5,000. By the end of 1887 the whole of the £35,460 raised on preference shares had been paid off, and the authorised bond debt of £50,000 had been reduced to £40,300, nearly the whole of which carried interest at 4½ per cent. per annum, and of which £1,000 might be repaid in the present year, and £39,000 in 1889. To the sum of £53,243 appearing by the profit and loss account to have been the profit of the year 1887 must be added £8,608 12s. carried forward from the previous year, making together £61,852, which was reduced to £45,824 by the payment of £1,028 for interest to 30th June last on the whole number of preference shares and £15,000 in dividend in October. Deducting from this sum £10,000 for depreciation of plant, there remained an available sum of £35,824, out of which the directors would propose to pay a dividend of 12s. per share, making up, with the 8s. per share paid in October, £1 per share, being at the rate of 6¼ per cent. per annum on the £16 shares. The payment of this dividend would absorb £22,500, and would leave £13,324 undivided. This last-mentioned sum represented the undivided profits of several years, and the directors considered that, as a measure of prudence, advantage should be taken of the present favourable opportunity of writing-off a substantial part of the £50,000 which had for the last five years appeared in the balance-sheet as representing goodwill. They would devote to this purpose £10,000. The low prices of the raw materials purchased by candlemakers which characterised 1886 continued during 1887, and even descended to a lower level than was reached during the previous year. Palm oil (taking Bonny as the typical sort), which in 1885 was as high as £28 per ton, fell in 1886 to £18 12s. 6d., and in 1877 touched bottom at £17 5s. The enormous stock at Liverpool—10,185 tons—with which the year opened was never sensibly reduced during the year, and at its close stood at 10,001 tons. In referring last year to the increasingly important candle-making material—paraffin—he remarked that there were not wanting indications that the extremely low prices which then obtained would, ere long, lead to a curtailment of the production. This forecast proved correct to a moderate extent, but the reduced production which took place in Scotland rose more from miners' strikes than directly from low prices. Towards the close of the year the price of paraffin scale, which had fallen as low as 1¾d. per lb., rose to 2¼d., and with this advance, and the settlement of the labour disputes in the north, there seemed every likelihood that the large production of 1886, amounting in Scotland to at least 24,000 tons of scale, would be again reached in 1888. The price of crude glycerine, which in 1885 was as low as £18 per ton, rose to £50 in 1886, and during last year ranged from £45 to about £50. Six years ago paraffin was bought at 5d. per lb.; now it could be obtained at 1¾d. It was impossible, however, to say how long these low prices would last. The report was seconded and adopted.

## COAL BRIQUETTES FOR STEAMERS' USE.

JUST a fortnight ago to-day an interesting trial of the suitability of briquettes for steam raising purposes on steamers was made on board the *Edinburgh Castle* in the course of her regular run between Glasgow and Lochgoilhead. A number of practical gentlemen—engineers, coalmasters, and others interested—accompanied the steamer, and "took notes" of the results. Among those present were Capta

Campbell, of the Wemyss Bay line of steamers; Captain Williamson, *Ethiopia*; Captain Bailie, harbour master, Greenock; ex-Provost Black, Airdrie; and Messrs. Simpson (of Mr. John Watson, Earnock), Lambie (Caledonian Railway), Jardine (Messrs. P. and W. M'Lellan), Grant (Linore), Kennedy (Greenock and Gourock Railway), Patterson (Anchor Line), Pate (Messrs. Merry and Cunningham), Pope (Messrs. Denney and Co., Dumbarton), Hawthorn (Dumbarton), Brown (Messrs. James Gardner and Sons Limited), Meir (Westrigg Colliery), and Johnstone (Leeds). The briquettes in use were those made at Westrigg Colliery by the Brode's patent, for which process many advantages over others in use are claimed. However that may be, there can be no question that the trial on Saturday was in many respects thoroughly satisfactory. Steam was got up quickly and was maintained easily throughout the run. The matter of cost relative to coal is yet to be decided; even on that head it was said the briquettes had the advantage, but that will be gone thoroughly into by those concerned. Of one thing there was no doubt—that the briquettes created less smoke than is generally found to arise from coal. In this respect they will certainly claim the approval of the large constituency who at all times, but especially in the summer season, patronise our river steamers. There was no "smoke nuisance," none of the dense black volumes usually emitted from the funnels, and an entire absence of those "live" particles which are invariably showered over the cabin end at each firing, to the discomfort of the passengers, and in many cases to the damage of clothes. If no more can be claimed for briquettes than that they get over the smoke difficulty, which of late years has become a growing grievance on our rivers, sufficient will have been attained to warrant their general use by steamboat owners. As respects the Brode briquette, its speciality consists in the use of farina instead of pitch and tar for mixing with the dross. In the course of the run the company were entertained to luncheon. Mr. J. M'Queen Barr, secretary of the Brode's Patents Company Limited presided, in the absence of the chairman, Mr. Miller, who, however, joined the party on the upward run. After repast an expression of opinion was invited, and the general testimony was favourable to the success of the trial. Captain Campbell, ex-Provost Black, Mr. Simpson, and others were satisfied with the results, the only matter, of course, that no one could speak definitely on being that of cost. More extended trials and by independent parties will be undertaken at once to settle that point, and on account of the importance of the issues involved, it is to be hoped that the conclusions will be satisfactory. While a number of the company left the steamer at Greenock, most of the practical gentlemen remained on board watching the progress of the trial until the Broomielaw was reached.

## THE LARD QUESTION.

THE following circular, issued by Armour and Co., of Chicago, concerning the proposed legislation against lard, covers the ground so thoroughly that nothing remains to be said.

The following important facts concerning "refined lard," and the proposed legislation against it, are respectfully submitted by Armour and Co., and your serious consideration is earnestly requested:—

1. That refined lard is a wholesome food product, being composed of prime steam lard, prime cottonseed oil, and oleo stearine, in approximately the following proportions, viz.: From 60 to 75 per cent. of prime steam lard; from 15 to 25 per cent. of prime cottonseed oil; and from 5 to 15 per cent. of oleo (or beef fat) stearine.

2. That refined lard is sold from ¼c. to ½c. per pound less than the price for prime steam lard, which benefits the consumer, and at an average profit of ⅛c. to ¼c. to the manufacturer, instead of the profit of 3c. per pound as falsely intimated by those opposing it.

3. That it is against public policy to tax any food products, or to restrict the sale of those which cheapen the cost of living.

4. That it is against public policy to discourage those industries which add to the wealth of the country by turning into valuable channels products which would be otherwise worthless.

5. That the promoters of this legislation are rival interests located at a distance from the base of supplies, and, therefore, unable to compete with Western refiners.

6. That the consumers of this country do not ask for this legislation.

7. That any tax legislation will place 250,000 merchants of this country under police surveillance, hampering their trade and impoverishing their customers.

8. That legislation of this kind is vicious and bad in precedent, and if this product is placed under the supervision of the National Internal Revenue Department, a hundred other industries will be justified in asking for similar legislation against their rival interests.

9. That, because of the surplus in the National Treasury, taxation should be reduced and not increased.

10. That if refined lard is taxed, from 60 to 80 per cent. of such taxation will be exacted from the hog grower, the cottonseed oil producer, or the consumer.

11. That the total lard production of the United States falls short 150,000,000 pounds of lard annually of supplying the necessary market requirements of the world.

12. That of the 525,000,000 pounds of lard annually produced in the United States, 320,000,000 pounds are exported, of which 40 per cent. is refined lard. That legislation of this character discredits American lard abroad, and that, as a consequence, both prime steam lard and refined lard will be prohibited from importation into foreign countries, or be otherwise discriminated against by such countries.

13. That refined lard, by reason of the discrepancy above mentioned, is a commercial necessity, and assists in making more valuable cottonseed oil and oleo stearine, which are pure and wholesome vegetable and animal products.

14. That the blending of cottonseed oil and prime steam lard in this production gives about $5,000,000 to the cotton growing interests of the South, and that the use of oleo stearine gives annually $2,000,000 to the cattle growing interests of the West.

15. That cottonseed oil constitutes 5 per cent. of the total value of the cotton crop, equal to $12,000,000, and the use of cottonseed oil in refined lard constitutes nearly one-half of this proportion; and that with proper encouragement, the cottonseed oil industries can be so extended as to enhance the value of the cotton crop 12½ per cent., or fully $5 per bale.

16. That cottonseed oil is already used as a substitute for lard in many portions of the country.

17. That refined lard is not deleterious to health; that it is in the most important respects superior to swine fat, and that it is not a commercial fraud, being sold at the very lowest possible margin of profit, and its component parts are in daily use in every household.

18. That such legislation as now threatens refined lard is so pernicious, so unwise, so un-American, unnecessary and inconsistent, that it should not be entertained a moment by fair-minded men, either in Congress or out of it.—*Oil, Paint, and Drug Reporter.*

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

IF the market had been inclined to mend last week, the weather was of such a sort as would have precluded any very marked movement in that direction. The snow seems to have taken off now, but the cold is still intense, and this rather untimely severity is naturally tending to a deadening of buying and selling operations. The immediate advent of genial weather, might, for instance, give sulphate of ammonia a parting lift; but as it is, the article has made rather a big drop since last despatch, and to-day it is freely offered at £11. 17s. 6d. f.o.b. Leith. If the hard weather holds, the drooping will most likely continue. At the end of this month, the various mineral oil concerns in Scotland, close their books, and proceed to the striking of the annual balance, with a view to dividend declaring, or otherwise. It is to be feared that the general result will prove to be very much "otherwise" this year, on account of the disastrous fortunes met with last summer and fall, in the shape of low prices and miners' strikes; but, although this is so, the prospects of the industry are much more cheery than they were twelve months ago. Prices are much less unsettled, and the former rivalry between makers has been, for the time, displaced by combination. The demand for bichromates has somewhat improved. Bleaching powder has fallen

off, and is lower in price. General prices current are:—Soda crystals, 40s., net Tyne; alum, in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £42 net Glasgow; soda-ash, 48/52° 1d., less 6 % Tyne; caustic soda, white, 76° £8. 5s., 70/72° £6. 15s., 60/62° £5. 15s., and cream 60/62° £5. 15s.; bicarbonate of soda 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52° 1½d., less 2½ % Tyne; saltcake, 21s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 12s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda 3½d., less 5 % and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 10½d.; chlorate of potash, 5⅝d., less 5 % any port; sulphate of ammonia, £11. 17s. 6d., f.o.b. Leith; sulphate of copper, £22; paraffin scale, hard, 2 3/16d., soft, 2d.; paraffin wax, 120° semi-refined, 2 11/16d.; paraffin spirit, 5d.; burning oil, 6d. to 6½d.; lubricating oil, 885° £6. 15s. to £7, 890/895° £7. 15s. to £8. Imports for the week have included 6,753 tons iron ore, 322 tons of sulphur ore, 1,167 barrels rosin, and (Greenock) 12,241 bags and 5,478 baskets sugar.

## THE LIVERPOOL MINERAL MARKET.

There is no material alteration to report in the mineral market this week. Manganese arrivals have been small, and prices are unaltered. Magnesite (containing 98 per cent. of carbonate of magnesia) unchanged at 30s. to 35s. for raw lump; raw ground, £6. 10s., and calcined ground, £10 to £11. Bauxite (Irish Hill brand) without alteration at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk has improved, and prices are firmer, 85s. for medium, and 90s. to 95s. for best GGB. Barytes (carbonate) continues scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone in fair demand; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone continues in fair demand at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore: The demand last reported continues, and prices are firm. Antimony ore, £15 to £16 for fair quality. Antimony metal from £49 to £50. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine) 17s. 6d.; more doing. Carbonate (native) £15 to £16; powdered (manufactured) £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s.; Spiegel, 20 %, £4. 12s. 6s. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest packed, £35; original prime, £18 to £23. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

The market this week has ruled very even, and there is no practical change to report. Soda-ash 1d. up. Caustic soda: 60 per cent. white at £6; 60 per cent. cream, £5. 18s. 9d.; 70 per cent. white, £7; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda: There is little improvement at 9s. 6d. to 10s. Soda crystals, £2. 13s. 9d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder, £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 21s. 6d. Bichromate of potash, 4⅝d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, £21. 10s. to £22. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic), strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc (solid), £18.

## THE LIVERPOOL COLOUR MARKET.

Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s.; Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s. 55s., to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d.; Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto, for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

Extreme dulness of trade prevails in almost every branch of the chemical trade, and prices generally continue to droop. Ammonia salts are moving very slowly. Sulphate is lower, and muriate is weak. Salammoniac maintains its price, but demand is below the average. Caustic sodas are again lower, and bleaching powder has slightly relapsed in price, though several works are well engaged, and nominal prices f.o.b. Liverpool is £7. 15s. Sulphate of copper is still offered below makers' prices. White sugar of lead is more inquired for, and price is maintained at £27 c.i.f British ports. Nitrate of lead, £23 at makers' works. Litharge is still well maintained. Acetates of lime are in better request, but prices are irregular. For future deliveries sellers are not pressing. Sulphur in various qualities is well maintained in price under comparative scarcity of supply. The future of this article will be considerably affected by recovery processes now being adopted in this country. Roll sulphur at present is £5. 15s. to £5. 17s. 6d. f.o.b. British ports. Potash carbonate and caustic are quieter, and prices are rather easier. Borax is offering at reduced rates.

## THE ALKALI TRADE.

Sodas are to-day weaker if anything, though we have very conflicting reports from the various buying and selling centres. Caustics of all grades are again lower, and it is reported that even this branch of the alkali trade is to be invaded by the ammonia-soda process. It is more than probable that before another year has passed away the markets will feel the influence of ammonia-soda caustic. Bleaching powder is weaker, but at the same time all the producers are busily engaged.

## THE TAR PRODUCTS MARKET.

There is still but little business doing in benzoles—90's may be purchased at 3s. 3d. to 3s. 4d., and 50/90's at 2s. 6d. to 2s. 7d. Solvent naphtha is in good demand, and the inquiry for crude carbolic acid still continues good. Creosote is fetching good prices. Anthracene is still firm, and 1s. 1d. to 1s. 2d. may be taken as the price for B quality. A quality is also in request at 1s. 3d. to 1s. 4d., the former being offered and the latter asked. On Manchester 'Change last Tuesday prices were reported a little firmer all round for tar products, but any hardening in benzol values is entirely mythical and speculative.

## THE SULPHATE OF AMMONIA MARKET.

Prices have steadily fallen during the week, mainly on account of the weather, bringing with it no continental demand, but also from the fact that certain producers must sell at any price. Any purchase at a lower level is immediately made use of by the speculators to further depress the market, but it is a good sign to find foreign producers still sanguine of the future. Values may now be taken as £11. 17s. 6d. Hull, £11. 15s. Leith, £12. 3s. 9d. London, and £12. 5s. Beckton.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

W. Welsford, & R. V. Elvey, under the style of the Dover Brewery Company, Dover, brewers, etc.

Kemball & Le Bert, Little Bridge-street, London, gas, hot water, and sanitary engineers.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Burckhardt, Edmund Christian, Chalk Farm-road, London, oilman.

Barnes, W. J., Rainham, Essex, chemical manufacturer.

#### Adjudications.

Burckhardt, Edmund Christian, Chalk Farm-road, London, oilman.

Crookes Joseph, Dundee, late of Eckington, Derbyshire, chemist and druggist.

Dearden, Zacharian, Denton, hat manufacturer.

#### First Meetings and Public Examinations.

Payne, Jacob Hugh, Thrapston, Northamptonshire, chemist and druggist, and sauce manufacturer. March 26, Bankruptcy Buildings, Portugal-street, Lincoln's Inn; April 17, County Hall, Northampton.

Marston, George Henry, Lordship-terrace, East Dulwich, late of Swiss-terrace, Forest Hill, Commercial-road, and Whately-road, East Dulwich, chemist. March 27, Bankruptcy Buildings, Portugal-street, Lincoln's Inn Fields; April 19, 34, Lincoln's Inn Fields.

Powell, David, St. Thomas, Swansea, chemist and druggist. March 27, Official Receiver's Offices, Swansea; April 12, Town Hall, Swansea.

#### Notices of Dividends.

Smith, George William (trading as G. W. Smith and Company) Laisterdyke, Bradford, Cleckheaton, Pudsey, and Farsley, near Bradford and Hipperholme, near Halifax, oil, grease, and soap manufacturer. First and final dividend of 2s. 3½d., March 26, Official Receiver's Chambers, Bradford.

Whitham, Joseph (trading as Joseph Whitham and Company), at Miles Platting, and Pendleton, Lancashire, as a chemical manufacturer, and as the Whitecroft Printing Company, at Baxenden, Lancashire, dyer and printer, also trading with T. Brayshaw, at Manchester, galvaniser, residing at Nelson, Lancashire. First dividend of 7s. 6d., March 27, 2, Clarence Buildings, Booth-street, Manchester.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Treating Water to prevent its action on Lead.**—A. H. Allen. 3636. March 9.

**Pulsometers.**—(Complete Specification.) E. Lund, Jr. 3656. March 9.

**Furnaces for Calcining Cupreous Ores.**—W. J. Howarth and J. Graham. 3660. March 9.

**Separating Tin from Scraps and Plates.**—A. Browne. 3661. March 9.

**Making Soda and Chlorine by means of Ammonia.**—A. M. Clark. 3668. March 9.

**Facilitating the Oxidisation of Sulphurous Acid.**—A. M. Clark. 3669. March 9.

**Lamps for Hydrocarbon Oils.**—J. M. Rowatt. 3673. March 9.

**Lamp Burners for Hydrocarbon Oils.**—W. Lightbody. 3674. Mar. 9.

**Disinfecting.**—D. Pick and A. J. Scott. 3707. March 10.

**Regulating the Discharge of Water.**—W. James. 3729. March 10.

**The Production of Deposits of Homogeneous Iron.**—A. E. Barthel. 3730. March 10.

**Extinguishers for Oil Lamps.**—B. J. B. Mills. 3736. March 10.

**Ore Concentrating Machinery.**—C. Appleby. 3741. March 10.

**Firing Signals.**—F. W. P. Bouverie and W. Balch. 3750. March 10.

**Brewing.**—B. W. Valentin. 3754. March 10.

**Explosives.**—E. Kubin and A. Siersch. 3759. March 10.

**Feed Water Purifier.**—(Complete Specification.) S. H. Mosher, R. Forsyth and T. J. Wheeler. 3762. March 10.

**Copper Castings.**—R. Murray. 3770. March 12.

**Lubricating Cream.**—(Complete Specification.) J. L. Wade. 3774. March 12.

**Mineral Oil Lamps.**—G. Rose. 3778. March 12.

**Oil Lamps.**—S. R. Williams. 3783. March 12.

**Waterproof Paper.**—T. J. Pearce and M. W. Beardsley. 3787. March 12.

**Boxes or Packages for Holding Fatty Substances.**—R. F. Young. 3788. March 12.

**Improved Manufacture of Metallic Alloys.**—(Complete Specification.) J. Y. Johnson. 3793. March 12.

**Incombustible Paint.**—(Complete Specification.) F. de Coninck. 3795. March 12.

**Rotary Engine and Meter.**—(Complete Specification.) J. Selwig. 3801. March 12.

**Making Coke in Blocks.**—(Complete Specification. A. Tack and F. Girard. 3802. March 12.

**Cupolas for Iron Smelting.**—(Complete Specification.) A. Leslie. 3806. March 12.

**Extraction of Metals from Complex Ores.**—J. C. Butterfield. 3823. March 12.

**Water Meter and Pressure Motor.**—A. Barclay. 3829. March 12.

**Improved Process of Distilling Petroleum.**—(Complete Specification. W. H. Pitt and G. H. van Vleck. 3830. March 13.

**Regenerative Gas Lamps.**—A. O. Brown. 3838. March 13.

**Anti-priming Apparatus.**—H. G. Warner. 3840. March 13.

**Gas or Caloric Engines.**—H. Guthrie. 3847. March 13.

**Annealing Furnaces.**—J. Halfpenny and H. Halfpenny. 3857. March 13.

**Production of Antiseptic Sprays.**—A. R. Upward. 3860. March 13.

**Apparatus for Burning Liquid Fuel.**—(Complete Specification.) J. B. Hannay and R. P. Doxford. 3863. March 13.

**Lamps for Burning Oil or Spirit.**—F. H Varley, W. D. Gooch and F. B. Lidstone. 3865. March 13.

**Apparatus for obtaining Oxygen and Nitrogen from Air.**—E. B. Ellice-Clark and L. Chapman. 3880. March 13.

**Preventing Contagious Disease in Lungs of Cattle.**—(Complete Specification.) L. Mandl. 3896. March 13.

**Crushing or Pulverising Ores.**—T. R. Jordan. 3900. March 13.

**Rotary Engine Blower or Exhauster.**—W. W. Wardle. 3909. March 13.

**Apparatus for Utilising Liquid Fuel.**—(Complete Specification.) C. R. Hoopes. 3910. March 13.

**Thermostat.**—C. P. Kinnel and G. Rothnie. 3911. March 13.

**Apparatus for Heating and Purifying Feed Water.**—C. Appleby. 3915. March 13.

**Briquettes.**—R. Anton. 3917. March 13.

**Coating Iron and Steel with Tin.**—J. Thornton. 3920. March 14.

**Manufacture of Iron and Steel.**—A. E. Tucker and G. Hatton. 3922. March 14.

**Extracting Gold by the Humid Method.**—G. de Wolf. 3926. March 14.

**Steam Traps.**—(Complete Specification.) W. Matthews and J. Yates. 3939. March 14.

**Incandescent Gas Lamps.**—N. K. Cherrill and H. Schlichter. 3942. March 14.

**Incandescent Gas Lamps.**—N. K. Cherrill and H. Schlichter. 3943. March 14.

**Air or Water-proof Tin Canister.**—R. Bartlett and W. H. Clayton. 3945. March 14.

**Hydrochlorate of Quinine.**—(Complete Specification.) P. M. Justice. 3949. March 14.

**Briquettes.**—R. Anton. 3950 March 14.

**Heating and Circulating Feed Water.**—J. Gilmour. 3957. March 14.

**Extraction of Oxygen and Nitrogen from Air.**—A. Brin. 3967. March 14.

**Apparatus connected with Centrifugal Separators.**—(Complete Specification.) H. H. Leigh. 3976. March 14.

**Dust Collectors.**—E. Kreiss. 3980. March 14.

**Plates for Secondary Batteries.**—B. M. Drake and J. M. Gosham. 3986. March 14.

**Indicating the Extent to which Gasholders are Charged.**—L. T. Wright. 3992. March 14.

**Manufacture of Butter.**—(Complete Specification.) C. A. Johansson. 3994. March 15.

**Galvanic Batteries.**—(Complete Specification.) H. H. Lake. 3995. March 15.

**Burglar-proof Safes.**—T. Fletcher and G. Cawley. 4011. March 15.

**Arc Lamps.**—G. E. Dorman. 4017. March 15.

**Coating with Tin, Lead, or other Metals.**—H. H. Taylor and W. P. Strivé. 4034. March 15.

**Process and Apparatus for ascertaining the quantity or percentage of Fatty Matter contained in Soap.**—A. Engelhardt. 4037. March 15.

# New Companies.

Carroll Boiler Water Purifier Limited.—Capital, £20,000 in £1 shares.

Colchester Native Oyster Fishery Company Limited.—Capital, £50,000 in £5 shares.

Delta Metal Company Limited.—Capital, £150,000 in £10 shares.

Exeter Electric Light Company Limited.—Capital, £20,000 in £10 shares.

Guabino Hydraulic Gold Mining Company Limited.—Capital, £50,000 in £1 shares.

Hispania Tin Mining Company Limited.—Capital, £175,000 in £1 shares.

Kidsgrove Steel, Iron, and Coal Company Limited.—Capital, £100,000 in £100 shares.

Moruya Gold and Silver Mining Company Limited.—Capital, £85,000 in £1 shares.

North Shields Ice Company Limited.—Capital, £1,000 in £1 shares.

Patent Enamel Company Limited.—Capital, £150,000 in £10 shares.

W. and R. Richards Limited (Brewers).—Capital, £11,000 in £5 shares.

Seaham Chemical Works Company Limited.—Capital, £20,000 in £100 shares.

Waterloo Brewery Company Limited.—Capital, £10,000 in £5 shares.

Yorkshire and Home-Made Bread Company Limited.—Capital, £20,000 in £1 shares.

# PRICES CURRENT. [THURSDAY, Mar. 22, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 9 | 0 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 11 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3½ |
| Picric | ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) | ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6½ |
| Arsenic, white powdered | per ton | 10 | 12 | 6 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1½ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 48 | 0 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 12 | 3 | 9 |
| ,, ,, (grey), Hull | ,, | 11 | 17 | 6 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8½ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 8 | 0 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 5 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 12 | 0 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 5 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 4 |
| ,, 50/90 ,, | ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2½ |
| ,, (crude 60°) | per gallon | 0 | 4 | 0 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 3 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 80 | 10 | 0 |
| ,, Sulphate | ,, | 22 | 0 | 0 |
| ,, Oxide (copper scales) | ,, | 75 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 1 | 0 | 0 |
| Lead (sheet) for cash | ,, | 15 | 15 | 0 |
| ,, Litharge Flake, ex ship | ,, | 16 | 10 | 0 |
| ,, Acetate (white) | ,, | 27 | 10 | 0 |
| ,, ,, (brown) | ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 17 | 15 | 0 |
| ,, Nitrate | ,, | 23 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 9 | 5 | 0 |
| ,, ,, (grey) | ,, | 13 | 15 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 18 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 5 | 0 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 3 |
| Naphtha (Wood), Solvent | ,, | 0 | 4 | 3 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 9 |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 3 | 6 |
| Cotton-seed | per ton | 21 | 0 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 6½ |
| ,, American | ,, | 0 | 0 | 6½ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 6 |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 6 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 7½ |
| ,, Sulphate, 90 % | per ton | 10 | 0 | 0 |
| ,, Muriate, 80 % | ,, | 8 | 10 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 7⅞ |
| ,, Nitrate | ,, | 0 | 2 | 7½ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 16 | 3 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 11 | 3 |
| ,, ,, (Soda Crystals) | ,, | 2 | 7 | 6 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 19 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 30 | 0 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 8 | 7 | 6 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 7 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 15 | 0 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 13 | 9 |
| ,, Bicarbonate | ,, | 5 | 5 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 5 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 10 | 9 |
| ,, Nitrite, 98% | per ton | 28 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5⅜ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 12 | 6 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 5 | 0 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 14 | 6 |
| ,, Cane | ,, | 0 | 17 | 6 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 8 |
| ,, Barium | ,, | 0 | 0 | 5½ |
| ,, Copper, 60% | ,, | 0 | 0 | 8½ |
| Sulphur (Flowers) | per ton | 9 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 2 | 6 |
| Tallow | ,, | 26 | 15 | 0 |
| Tin (metal) | ,, | 159 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 9⅜ |
| Zinc (Spelter) | per ton | 19 | 0 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, March 31, 1888.**


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## ON COLOUR MATCHING.


BY WALTER EMMOTT, M.S.T.E. AND E.
*(Blakey, Emmott & Co. Limited, Halifax);*
AND WILLIAM ACKROYD, F.I.C., ETC.
*(Borough Analyst, Halifax).*


### INTRODUCTION.

THE title of the present communication which we make to the Society of Dyers and Colourists was chosen many months ago, and since then we have given much serious attention to the subject. The more, however, we have studied it, the more intricate has it appeared to become, defying us in the line of investigation we have followed to arrive at definite general laws. Nor did it appear possible to derive much information from any published works we are acquainted with. To Chevreul, as a past director of the dyeworks of the Gobelins, one naturally turns, but reference to his well-known work on colour gives very little information; he deals with broad contrasts for the most part, and not with the minute differences which a dyer would term "a bad match." In other works on dyeing the subject is generally dismissed in a few paragraphs. But, although published information is so scanty, there is not a dyer of extended experience who has not a large stock of information on this very subject, and can relate experiences of interest and value. Therefore, we feel much diffidence in addressing a body of dyers, and would ask your indulgence beforehand for any slight errors we may unwittingly commit.

### WHAT IS COLOUR MATCHING.

1. In answer to this question the practical dyer would most probably say: "The comparing of a sample swatch with recently dyed goods, to see if they are of the same colour." Given a sample of a certain coloured material, he exercises his art in producing a quantity of dyed goods, whether in the raw fibre, spun fibre, or woven, which shall be of exactly the same colour and shade as the sample when viewed in daylight. Simple as this observation appears to be, and short as we know it is, it is subject to certain sources of error, which may be personal or pertain to the dyer himself, may in a measure arise from the nature of the colour, or may be due to the source of the light, more especially if this be an artificial one. We therefore propose to inquire how this observation of colour matching is affected :—

(1) By idiosyncrasies of the observer;
(2) By the nature of the colour; and
(3) By the character of the light.

### IDIOSYNCRASIES OF THE OBSERVER.

2. The first requisite for colour matching is a keen power of discrimination of colour. It goes without saying that the dyer ought to have a good eye for colour. The colour of the apple and of its leaves ought not to appear to him the same, as was the case with Delbœuf; nor ought he to be in any danger of donning red stockings under the impression they are green, as was the case with the famous John Dalton. It is not possible to conceive of one suffering from Daltonism following the art of dyeing with any measure of success. Here, as in every other line of life, it is a question of the survival of the fittest, and the man who in attempting to

match a red swatch employed a recipe for green, would certainly have to give way to others with greater colour discernment. New difficulties would spring up at every turn, unheard of effects would be obtained in artificial lights—probably as startling as that of Dalton's, who found that the violet petals of the *geranium zonale* appeared red to him by candle light, although it certainly seemed blue by daylight—and under an accumulation of disasters he would finally succumb. This weeding out is a painful, and in some instances an expensive, process, and considering moreover that probably 5 per cent. of our people are colour blind, no youth ought to be apprenticed to dyeing who has not shown, after a rigorous examination, that his colour-sense is perfect. For detecting colour blindness, Dr. Stilling's test as applied to railway servants, has been found very effective. It consists of a number of red, light green, and dark green squares, separated by black borders. The red squares form a letter of the alphabet or some common figure, and along with the others make up some such design as that given in the diagram. With several such plates before him, each containing a different letter, the colour-blind individual betrays himself by his inability to make out the letters.

Another personal matter is that of eye fatigue. Even those who know little of physiology are acquainted in these days of scientific advertising with the fact that if you stare at a red for any length of time the eye becomes fatigued for that particular colour, and upon turning the attention to a white surface a bluish green image is seen, or, in other words, a complementary colour. Now the tendency to this eye fatigue varies in different individuals, and also in the same individual at different times. In the matching of a great number of samples of the same colour the eye becomes wearied for that colour, and its power of discernment for delicate shades is temporarily weakened. This weariness may in a measure be removed by staring at a card with the complementary colour on it. The same fact often inconveniently obtrudes itself where a buyer is examining a coloured article for any length of time; his eyes become fatigued for that particular colour, and now he becomes dissatisfied with what he sees, which is not the real colour of the article, but the real colour plus some amount of its complementary.

Again, in advancing years the crystalline lens of the eye may become tinged with yellow, which will have the tendency to make blues appear darker than they are. This leads the artist, in reproducing colours with blue in them, to make them too blue. The artist is a colour matcher; he tries to put on canvas precisely similar tints to those he sees in nature, but his colour matching appears, as was the case with Mulready, to be affected by this yellowing of the crystalline lens. We are not in a position to assert what amount of influence it may have on a dyer's colour matching.

These, and no doubt other peculiarities of sight, introduce a certain amount of personal errors into the observation of colour matching which the well-informed dyer ought to be acquainted with, so that he may be able, on their occurrence, either to allow for them or entirely to obviate them.

Before proceeding to deal with the nature of the colour, and the character of the light as affecting matching, we will describe our methods of observation.

### METHODS OF OBSERVATION.

**1. Regarding Colour.**—3. For delicacy of observation of differences of colour the unaided eye is not to be surpassed; here the spectroscope can give no aid. An extremely weak solution of permanganate of potash, which has a decided colour to the eye, may fail to give any absorption bands when viewed by the spectroscope. This instrument may, however, be useful if used with discrimination. Where we have had to call it into use the following method of observation has been employed. The dissolved substance of known strength has been put into glass cells of from 1 to 50 centimetres in length, with the ends at *a* and *b* of thin microscopic glass; the absorptive effect has then been noted in the spectroscope and plotted down, as in the following diagrams, where the horizontal lines represent the scale of the spectroscope and the vertical lines the cell lengths.

Fig. 1.

In illustration of this method, devised by one of us,* we give the quantitative absorption spectra of iodine green and magenta, Figs. 2 and 3.

**II. Regarding Light.**—4. Again, we do not consider the spectroscope of much practical use for determining the nature of a light. For this purpose we have utilised what is generally regarded as a defect of the shadow photometer—viz., the colours of the shadows. If two lights of equal intensity cast adjacent shadows of a common object, these shadows give a correct cumulative idea of the nature of the lights, thus—*e.g.*, the shadow illuminated by an incandescent lamp is of a pale straw yellow, when compared with that of a similar shadow illuminated by the arc lamp, which is of a bluish violet tint. The lights we have used are marked by a preponderence of blue or yellow when compared with each other.

**III. Regarding Colour Matching.**—5. In the endeavour to arrive at definite information with different kinds of light, we have adopted a method of slight contrasts—*i.e.*, two colours of the same quality, but differing in quantity, have been compared, to see in what light they matched, and in what lights they appeared to match or be the same. The inference being that where slight differences of amount of colour were not discernible, the light-source was not so good for purposes of matching-off as one where the difference was readily seen. For this purpose a set of six test-tubes were employed, each with a column of liquid in of the same length, and numbered one to six. In the first a unit quantity of the colouring substance was placed, and in the second twice this, in the third three times the amount, and so on, there being an increment of one unit of colouring material in each tube up to No. 6. The tubes being now thoroughly mixed by another person, the observer comes and sorts them out, according to the depth of the colour seen by the transmitted light. In certain lights the differences are scarcely discernible, and the numbers obtained are not in arithmetical order; in other lights the differences are perfectly apparent, and a correct order of the numbers is readily obtained.

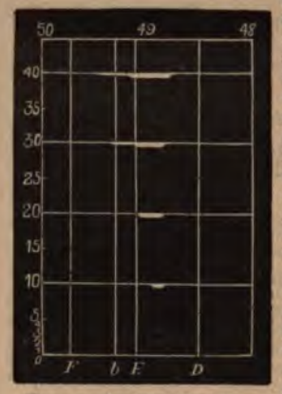



FIG. 2. IODINE GREEN.

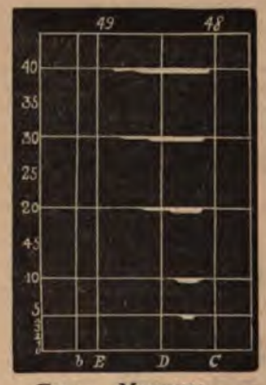



FIG. 3. MAGENTA.

### EXPERIMENTS AND OBSERVATIONS ON COLOUR MATCHING.

**6. Is a given difference of colour more readily discerned in weak or strong colours?**—In Fig. 5 we present the quantitative absorption spectrum of bichromate of potash. It will be observed that for small increments of weight of the salt in weak solutions there is a rapid increase in the amount of absorption, the absorption curve being nearly parallel to the line E D; but that when 20 to 30 centimetres of solution is being looked through the increase of absorption is much less rapid, the curve then taking a course nearly at right angles to the line E D. Here we have a scientific expression of the fact that a given increment of colouring in weak colours is more easily discerned than the same increment in deep colours. The same fact may be thus practically demonstrated. Fill the six test tubes up to a certain height with water, and then introduce ·0002grm. of bichrome into No. 1, 2 × ·0002grm. into No. 2, three times the unit amount into No. 3, and so on up to No. 6. If the tubes be now mixed and an attempt be afterwards made at sorting them according to depth of colour, a correct order will be obtained in a good

* Ackroyd on "Transverse Absorption of Light," *Chemical News*, Oct. 5, 1877.

such works were driven to the use of the electric light after it had become a commercial possibility.

11. **Comparison of Lights.**—As a comparison of the various lights which have been used will be of interest, we give the results of our observations with the shadow-colour test. Broadly speaking, they divide themselves into bluish and yellowish lights, and as this is entirely a question of degree, they may be arranged in a series such that any one above is bluer than one below, and *vice versâ* any one below is yellower than one above, thus:—

BLUER.

(1.) Arc lamp.
(2.) Coal gas.
(3.) Incandescent lamp with blue shade.
(4.) Incandescent lamp with yellowish-white shade, and Tallow candle.

YELLOWER.

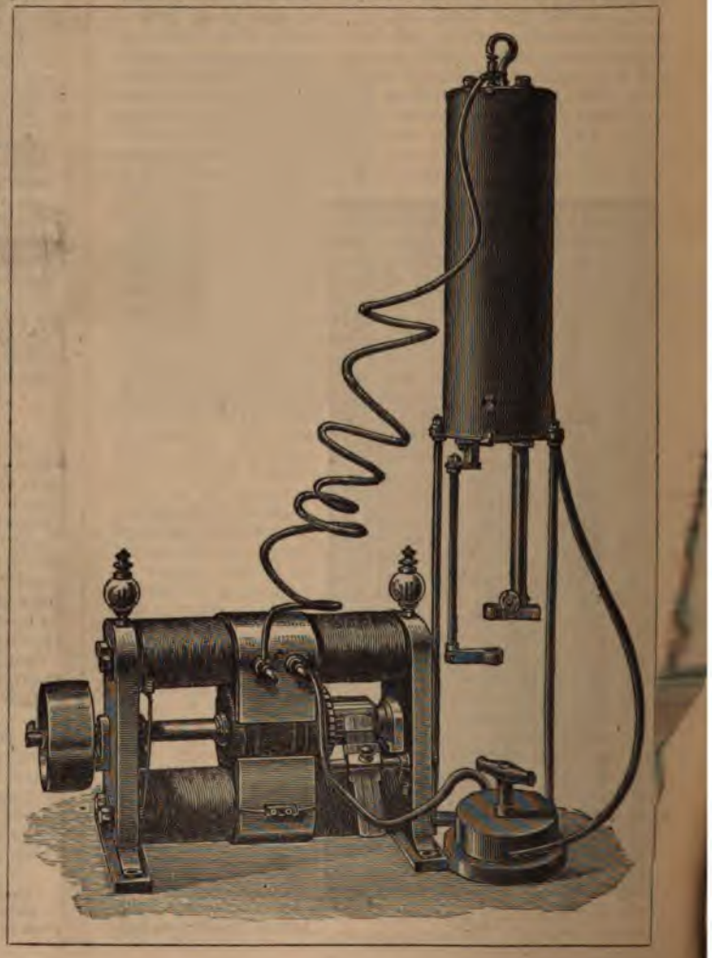
12. **Arc Lights.**—We have made a series of experiments with different makes of carbon to test their relative efficiencies. Two Pilsen lamps were joined in series with a current of 12 ampères flowing through them, there being an electromotive force at the terminals of each lamp of 50 volts. The lamps were in perfect regulation, and the one kept as a standard had a cored positive carbon and a solid negative one, both uncoppered. With this standard there were compared coppered carbons and carbons both of cheap and expensive quality uncoppered. The coppered carbons gave out a bluer light than the standard, and at every variation of the arc a purplish light was emitted. This was not due solely to alteration of length of arc, but more to the nature of the carbons, since there were the same alterations in the standard lamp without the emission of an excess of violet rays. This peculiarity of coppered carbons we regard as objectionable to their use for colour matching, although there are thousands in use at the present time for this purpose. The cheap and the expensive makes both emitted purpler light than the standard, and all, including the standard, were purplish when compared with the light of magnesium ribbon, which was of a bluish-green tint.

OBSERVATIONS ON ELECTRIC LIGHT APPARATUS.

In view of the growing importance of the electric light for colour matching, a few practical details concerning it will, we think, form a fitting conclusion to our communication. The essentials of a good dynamo may be considered under the two headings of mechanical and electrical efficiency.

13. **Requisites of a good Dynamo as a Machine.** The proportions of the shaft and bearings should be such that any chance of undue heating is reduced to a minimum, while firmness is secured; and the material of which the shaft is formed should be of such a nature as to withstand the maximum amount of strain ever likely to be put upon it. Steel is the most suitable material for this purpose, and when run in gun-metal bearings is very efficient. The proper lubrication of the machine is of great importance. It is no uncommon thing to see a machine deluged with oil, which, in addition to the waste, is highly detrimental, as it gradually destroys the insulation by rotting the cotton of the field magnets. This has led us to adopt a simple form of sight-feed lubricator, by which the attendant can make sure on starting his machine that neither too much nor too little oil is supplied. The armature should be securely fixed to the shaft, and in most modern machines a spider or its equivalent is keyed or otherwise firmly secured to the driving shaft, and to the core of the armature, thus preventing the fault so common to the older forms of machine with wooden hubs, in which it was no uncommon circumstance to find the hub shrink, and with a full load on the machine the armature would remain stationary while the hub and shaft were revolving. The commutator should be made of a metal or alloy offering a low resistance to the passage of the electric current, and copper or one of its alloys suggest themselves as the most suitable. Phosphor bronze is used by many renowned makers, but our experience has led us to discard it, especially where large currents have to be taken off; as, no matter how carefully the phosphor bronze alloy may be made, there is a risk of want of homogeneity, which leads to an unequal wear which seriously impairs the efficiency of a machine. We find hard-drawn copper is not open to these objections. The commutator strips must also be insulated with a material which will not tend to clog the commutator by collecting any minute quantities of metal dust which may be formed by careless adjustment of the brushes on the part of the attendant. Mica has been found to be the most suitable for this purpose. The collectors (or brushes) should be secured in holders having a spring adjustment of such a nature that, without being complicated, the necessary small pressure required can be readily obtained. The width of brush and the depth of commutator strip should be duly proportioned to the work required of them. For machines giving a current of over 50 ampères we recommend double sets of collectors or brushes on each side.

14. **Electrical Requirements.**—The objects to be aimed at are a maximum electrical output for a minimum expenditure of power in driving. In obtaining this the proportions of copper and iron in a machine have to be carefully considered; also the nature of these metals and the form of the machine sometimes called the "type." In a well-proportioned machine there is no difficulty in obtaining a return of over 90 per cent. of the power used in driving. The importance of this "commercial efficiency," as it is termed, may be illustrated by a rough example. Take a dynamo requiring 10 horse-power to drive it at full load, or about equal to 100 Edison-Swan incandescent lamps of 16 candle-power. A reduction of 10 per cent. in commercial efficiency would mean 1 horse-power wasted in driving the machine with the full load. Calculating 1 horse-power to cost £5 per annum for 2,800 hours' run, we shall find it is cheaper in the end to give £10 more for the machine and have it efficient; as, allowing 10 per cent. for depreciation and 5 per cent. for interest on the extra outlay, we get 30s. per annum as against £5 for coal, or a clear saving, so long as the machine is used, of £3. 10s. per annum. We cite this illustration to show the importance of those using dynamo



## BLEACHING COTTON WITH HYDROGEN PEROXIDE.

OWING to the expense entailed by the use of hydrogen peroxide it can only be utilised for finer yarns and textiles.

I. **Preparation.**—The yarn or the textile is first of all treated in a soda solution—100 parts water and 10 parts soda solution of 1·16 specific gravity—in a boiler for the space of six to eight hours, then rinsed and squeezed, it being then adapted for the actual bleach process. Either a direct hydrogen peroxide bath can directly be brought into requisition or a preliminary bleach with soda can be used.

II. **The Bleach Bath.**—Ten litres of hydrogen peroxide are mixed with 200 grammes of spirits of ammonia, ·0935 sp. gr., into which the material is plunged. Temperature, 20° to 30° Celsius. Duration of the bleach about eight to twelve hours. Vessels used must be of wood. Metallic vessels must be avoided. When the bleaching has sufficiently progressed the fabric should be passed through a wringing machine and then dried in the air under the influence of light.

III. **The Bleach Bath with Bleaching Soda.**—The prepared yarns or textiles are passed through an acid bath of 1·03 specific gravity, they are then brought into a bath of bleaching soda, 1·005 specific gravity, the pile is allowed to remain for the space of one hour, it washes itself, and must then be passed through a soda bath of 1·07 specific gravity, washed with water and then, after being passed through a wringing machine, brought into the hydrogen peroxide bath (II.)

The hydrogen peroxide first of all destroys the remains of the chlor quantities, but also acts as an anti-chlor; in the second instance it removes the remains of colouring matter still present, so that a complete and intense bleaching results.

## THE COLLAPSE OF A CHEMICAL FIRM.

THE public examination of Messrs. Wm. Lockwood and John Leith, took place at the Liverpool Bankruptcy Court, on the 19th instant, before Mr. Registrar Bellringer. Their statement of affairs showed unsecured creditors £19,475. 6s., creditors fully secured £10,459, and creditors partly secured £11,680, of which £6,625. 1s. 7d. is expected to rank against the estate, making a total indebtedness of £26,100. 7s. 7d. The assets consist of cash in hand £66. 10s. 6d.; stock-in-trade, plant, etc., £5,205; and good book debts, £905—total, £6,107. 1s. 10d.; and leaving a nett deficiency of £19,993. 5s. 9d. Mr. Sparrow, barrister (instructed by Messrs. Oppenheim and Malkin, St. Helens), appeared for the debtors and also on behalf of the executors of the late W. L. Evans. Mr. Oppenheim represented Messrs. Knight, Hill, and Co., and Mr. Hawkins watched the proceedings on behalf of Colonel Gamble.

Mr. Lockwood, examined by Mr. Gittins, the official receiver, said the partnership between himself and Mr. John Leith commenced in December, 1873. He introduced about £5,000 into the firm and Mr. Leith about £600. Since then he had drawn about £7 per week as his salary, and in addition he had drawn about £1,100 or £1,200 during the fourteen years. Up to 1882 he only had a salary of £5 per week, but afterwards he drew £7 in addition to the £1,100 or £1,200 he had named. Mr. Leith had not drawn anything besides his salary of £5 and then £7 per week.

The Registrar: Are you on equal footing?

Mr. Lockwood, continuing, said they were. There were articles of partnership but he really did not know where they were. They were drawn by Mr. Collins, of Collins and Robinson, and Mr. Oppenheim.

Mr. Gittins: Do you know where they are?

Mr. Lockwood: I don't. The trustees will very likely have them.

Mr. Gittins: Where did you get your £5,000 from that you put into the firm?

Mr. Lockwood: I got £3,000 from Mr. Evans, £1,500 from my mother, and some from a gentleman called Hexby.

Mr. Gittins: Was this £3,000 borrowed money?

Mr. Lockwood: No; it was a present on conditions that if the business was successful I would pay it back; if not successful it was a gift.

Was this a written agreement?—It was embodied in a letter.

When was this money given to you?—In 1884.

Have you scheduled Mr. Evans as a creditor for £3,000?—No.

Have you scheduled your mother?—No; she has since died and left me more than that amount.

How much?—About £2,000.

Are you entitled to any money from any other source?—I am entitled to something under Mr. John Hexby's will, but I am entitled to no other money under will, settlement, or deed of any kind.

Have you disclosed the fact that you are entitled to money?—Yes.

You say Mr. Leith put £600 in the firm; where did he get it from?—I don't know where he obtained it.

You transferred £300 to Mr. Leith. Was that to make up the £600?—No; it was in addition.

It was arranged that you should look after the commercial part of the business and Mr. Leith the practical part?—Yes.

What did you give for Boundary-road Works?—£3,000, subject to £180 ground rent, and we have manufactured there caustic soda.

In answer to further questions, Mr. Lockwood said that for the first year, 1874, his loss was £1,277. 16s. 2d.; 1875, £1,627; 1876, £922. 9s. 5d.; 1877, £477. 4s. 7d.; 1878, £1,351; 1879, £987; 1880, £2,631; but in 1881 there was a profit of £166.

The Registrar: Very small in comparison.

Mr. Lockwood, proceeding, said that in 1882 they lost £572; in 1883, £120; in 1884 they made a profit of £269; in 1885, lost £408; in 1886, £129; and from this statement of affairs in 1887 they found they had lost £5,341.

Mr. Gittins said he noticed that losses so far back as 1880 had not been written off until 1888, and wished to know why this was so.

Mr. Lockwood said it was the system of bookkeeping.

There were also a number of bad debts which had been written off in 1888.

Mr. Gittins: How did your accounts and Mr. Leith's stand on the 30th July, 1880?

Mr. Lockwood: There was a balance of £2,690 to my credit, and to Mr. Leith's a debt of £3,964, a difference of over £1,200.

Mr. Gittins: You were £3,000 to the bad in July, 1880. Have you put any money in the firm since to reduce that?—In 1881 I put in £80; that is all. Mr. Leith in 1881 mortgaged his private house and put in £800.

During the year 1887 you made a large contract to supply bleaching powder, and the loss on that through non-fulfilment was about £3,000?—Yes.

Why did you take such a large contract in the face of your position?—We expected to get a profit out of it.

But you did not make bleaching powder before?—I believe you gave about £3,000 for the Boundary-road works?—Yes.

And have spent large sums of money on it?—Yes.

And the differnce between its present value and the money spent upon it is £5,600?—Yes.

The Registrar: Have you valued the works yourself?—Partially.

Mr. Gittins: And you have had a loss on the Parr works?—The first cost of Parr works was £10,000, and we have spent upon it £7,000 in addition.

When you purchased these works did you not know you were in a state of hopeless insolvency?—No.

Did you not think it was a foolish thing to do?—No, we did not consider it so.

When you knew you were practically deficient £6,000, why did you rush into an expenditure involving £10,000 and another £7,000 on the top of it?—The reason was that we had no place in which to deposit our waste.

Was that the only reason?—We wanted a place to make caustic soda, but we were really driven to it for want of a waste deposit.

The Registrar: But how do you justify the purchase of the Parr works?

Mr. Lockwood: It was simply because we had no place to deposit waste, and the next reason was that we could make caustic soda cheaper. These are the two reasons. There was a great deal of material which might be manufactured or utilised.

The Registrar: How did you arrive at the cost of these works?—There was a mortgage of £25,000 on it, and we gave £10,000 and a mortgage.

Mr. Gittins: Have you any prospect of introducing any more money in the firm to make up the present deficiency?—No.

Mr. Gittins (to the Registrar): I don't complain of the

# Our Book Shelf.

Outlines of Qualitative Analysis. By G. W. Slatter. Associate of the Royal College of Science, F.I.C., F.C.S., etc. London: Thomas Murby.

This small text book of Qualitative Analysis, we are told in the preface, has been used by the author's pupils in the laboratory of the Salt Schools in the shape of notes in a lithographed form, for the past seven years, and the high results obtained with them have led to their publication in the present form.

We like the book, it is not bulky, and there is no superfluous matter; the directions given are clearly written and easily understood, and the first thirty pages contain matter of great value to a beginner. At the end of the book may be found a series of very useful tables, which no doubt the student will benefit by consulting. There is one fault, in our opinion, and that is the omission of any mention of the rarer metals. We are aware that this is a general failing; but in qualitative work we see no reason why the reactions of the rarer metals and elements should be omitted, or why they should not be brought into their proper places in any tabular system.

# Legal.

## QUEEN'S BENCH DIVISION.

(Before Mr. Justice Manisty.)

M'ILWRAITH, M'EACHERN, AND CO. v. LAWRIE AND CO.

This was an action to recover damages for breach of contract.

Mr. James Fox was for the plaintiffs; Mr. Terrell for the defendants.

The plaintiffs, by letter dated April 27, 1886, requested the defendants to furnish prices for a supply of 30 tons of chloride of lime in strong casks, which the defendants gave by letter, dated April 29, varied by a letter on May 1, and thereupon an order was given by the plaintiffs to the defendants on that date for sale and delivery by the defendants of 30 tons of chloride of lime, to be delivered in strong hardwood casks f.o.b. in London, and sufficiently packed for an Australian voyage. The goods were brought to London and shipped on board the sailing vessel *Advancement*. The mate refused to give a clean receipt for the goods, and marked the same with the words "old casks," and to enable the plaintiffs to get a clean bill of lading the defendants gave a letter of indemnity, dated May 25, 1886, in in these words:—

"In consideration of your accepting receipt by the *Advancement* for 52 casks of bleaching powder, destination Rockhampton, which bears the following clauses—viz., 'old casks,' we hereby undertake and agree to pay, on demand, any claim that may arise, and to indemnify you against all consequences of your so doing.

"(Signed) James Lawrie and Co."

On the arrival of the vessel at Rockhampton, after a voyage of five months, the goods were landed in bad condition, and were damaged to the amount of £52 10s. It was contended, for the defence, that the goods were delivered in strong hardwood casks, and were sufficiently packed for an Australian voyage; that the plaintiffs had the selection of the vessel, and chose to send the cargo in a sailing vessel, and it was there own fault if anything happened to it; and that there was no evidence the cargo was not packed for a reasonable Australian voyage—*i.e.*, in a steamer and not in a sailing vessel; that no consequences has arisen by accepting the mate's receipt. The casks had not burst from the fact of the receipt having an imperfect mark on it. It was admitted, for the purpose of the action, that the chloride of lime was not packed sufficiently for an Australian voyage in a sailing vessel, and that the plaintiffs had in consequence thereof, sustained damages to the extent of £52 10s.; and it was submitted that this admission had no effect on the defendants' case. Evidence was called by the defendants to show that chloride of lime was of a very unstable character, and there would be great difference in the probability of a cask standing during a six weeks' or a five months' voyage. It would be acted on by the air, and there would be a swelling which would burst the cask; that the conditions would be different if packed in lead or tin-lined cases, and that the cost would be from 50s. to 70s. a ton extra; and that this term hardwood cask was well-known in the trade, denoting the staves of old sugar hogsheads imported from America, remade, and built up with iron hoops, but not air-tight.

His Lordship, in giving judgment, said the action was brought for an alleged breach of contract, which he read as to the indemnity. He dismissed that part of the case, for there seemed to have been no consequences from the acceptance of the mate's receipt for the goods with the words "old casks." The question was whether they were hardwood casks sufficiently packed for an Australian voyage. The words gave rise to a good deal of difficulty, but he thought the words must be taken in conjunction with each other. The goods were to be sufficiently packed—that was reasonably sufficiently packed—as well as could be done, and be reasonably sufficient for the purpose. If the plaintiffs chose to send the cargo by a sailing vessel on a five months' voyage they took the risk. The defendants gave no warranty, and had nothing to do with the fact of the temperature being so high as to burst the casks. The contract must be construed with reference to that essential part of it that they were to be packed in hardwood casks; and it would be a strange thing if the vendors had taken on themselves to warrant. He was perplexed by the extraordinary admission of the defendants, but he thought it meant that they had fulfilled their contract, and that the casks were packed according to order. The defendants had not broken their contract, and he therefore gave judgment for them, with costs.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

H.H.; J.C.; Ajax; A Fellow; Luke Sharp; D.D.—Your letters shall appear in future numbers.

W. Jesse Lovett.—Your letter appears this week.

D. H.—Yes. The market has fallen through the action of speculators.

H. H. H.—We are not supplying cases for binding.

Pump.—Apply to the Worthington Co. direct. They will give you all the information you require.

Bleacher.—The lecture on the applications of electricity to chemistry will be delivered on April 4th.

Chemical Manufacturer.—We cannot give credence to the report. It is too Utopian.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

[The following letter which has been refused admittance in another Chemical Journal, we have pleasure in finding room for here. We may say that during the past week we have received no less than seven letters on the same subject, and seeing that so much interest is displayed in the matter, we are willing to open our columns again to a fuller discussion of the question. At the same time we cannot occupy too much space in each number, so that we must spread the correspondence over so many weeks, taking the letters in the order of their receipt.—Ed. *C. T. J.*]

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—I have waited hopefully for a few days, as suggested by Mr. Friswell, for the "most lucid treatise on the aims and intentions, hopes and aspirations of our body;" but as usual in matters connected with the Institute I have to wait. The annual meeting was held March 1, and it is now the 19th and no report has been received by me. I notice in the last balance sheet £165 for salaries and wages, and £88 13s. 7d. for printing, stationery, and postage, from which I infer that the work done in connection with the Institute is paid for, and certainly we have a right to have say 500 copies of the Report and Address in less than a fortnight,—a private firm would do it in a day or two.

But this *en passant*. Not having the promised address I have had to turn to the literature of the past, and for what I know of the proceedings at the annual meeting I am indebted to a report published in the *Chemical Trade Journal*, which is, I believe, the first time the report of an annual meeting of the Institute has appeared in the public press. Let us hope it will not be the last time.

Mr. Friswell has not answered my three plain questions, which I think is much to be regretted, because his reply would have been of more value than mine as coming from one who has been a member of the council. There seems to be an opinion abroad among Fellows, and chemists who desire to be Fellows, that some substantial benefits will accrue to them in return for the trouble and expense of becoming Fellows. I had hoped Mr. Friswell would have removed any doubts on this matter, but he has not. I have therefore overhauled the past addresses, etc., and will give some information myself.

Quoting then from Professor Abel's address (1881 Report), the original circular stated that the objects of the Association was "to ensure that persons adopting the profession of consulting chemists or acting as analytical chemists for reward, are qualified by study and training for the proper and competent discharge of the duties they undertake." Again, in the Memorandum of Association:—

(A) "To promote and encourage a thorough study of chemistry and all branches of science allied thereto in their application to the arts, to agriculture, to public health, and to technical industry."

(B) "To adopt such measures as may be necessary for the advancement of the profession of chemistry, and particularly for the maintenance of the profession of the consulting and analytical chemist on a sound and satisfactory basis."

The whole tone of this address is to show that the Institute is to furnish by its Fellowship *a guarantee to the public*, that in employing a chemist they are getting value for their money, without guaranteeing the chemist a *quid pro quo*. Rather a pity the public does not subscribe just as well as we Fellows have been doing! Professor Abel spoke of the "true functions of the society, towards the fulfilment of which each member should willingly contribute, even if only with the comparative *narrow view of a substantial return hereafter*"—a remarkable sentence looked at in the light of recent experience. The italics are mine. As bearing upon Mr. Friswell's concluding paragraph about our friends "Smith and Robinson," I will quote the address of Professor Abel (1882 Report). "Being fully alive to the *duty* as well as the *prudence* of meeting if possible the very *human* desire of a section of Fellows of the society, for some immediate return or promptly rendered *substantial equivalent* for the annual contribution to the funds of the Institute, your councils have striven to furnish this." The italics are mine. This takes the sting out of the tail of Mr. Friswell's letter. But, by the way, How did the council "strive?" Why, they had delivered and paid for certain lectures by experts, and took very good care not to publish and send a verbatim report to each Fellow, so the benefits, whether intentionally or not, were chiefly confined to the London Fellows. This has caused considerable discontent among provincial Fellows.

The desire to be brief and to minimise my trespass on your space compels me to pass over several other passages, showing what has been said as to the aims and intentions of the Institute, but they are pretty well covered by what I have already quoted.

Dr. Odling (1884 Report) compared the Institute with the Institute of Civil Engineers, but the member of the Institute of Civil Engineers receives a decent sized, well executed certificate, while we Fellows of the Institute of Chemistry receive a paltry little bit of paper saying we are "registered" (I beg pardon they use a capital R.), "having duly paid the fees." What about competency? This is another cause of discontent: the certificate certifies—not that a Fellow is competent—it does not even stop at "as a Fellow of the Institute of Chemistry," but it goes on to certify to his "having duly paid the fees." Why have the council done this? I can safely assert, in spite of what has been said against testimonials, that any one testimonial from any firm with which I have been connected would go further, *i.e.* have greater weight in gaining for me an appointment with another firm than such a paltry bit of paper. This is a thing which must be considered, for it is not every Fellow who can rejoice in the security of a government berth or a professorial chair; many, perhaps the majority, will be engaged in the service of manufacturing firms, and in such cases a handsome certificate, which keeps in the background any statement about "fees," will do much to help the fortunate possessor to a desirable position.

When a chemist who has devoted his energies to "advance in general service for the common good," falls out of the ranks and goes over to the majority, What does the Institute do? Well: the appeals I have received up to date are—so far as I can remember through the Society of Chemical Industry—even where the subject has been a professor. Perhaps the Institute in these matters does "good by stealth," and would "blush to find its fame." I do not say the Institute was formed with philanthropic objects. I wish it to be known that it was not, so Fellows must not expect anything in this direction.

Dr. Frankland has stated (Ch. News, Dec. 18, 1885), that "Its object is certainly not that of the modern trades unions." So Fellows must not expect the Institute to do anything to bring about a higher scale of remuneration. "On the contrary," continued Dr. Frankland, "its chief intentions are educational and ethical." This sentence should at once settle any doubts in the minds of Fellows and intending Fellows as to any substantial benefits.

The Institute does not then appear to be intended to confer any actual substantial benefits upon its Fellows, save the certificate of competency and the lectures by experts. The Institute so far has not conferred, therefore, any substantial benefit upon its Fellows, because the certificate of competency is not a certificate of competency, and the lectures by experts were not printed and issued to each Fellow.

Every Fellow, provincial or otherwise, has a right to a Certificate of Fellowship fit to hang in the consulting room, without being ashamed of it, and to verbatim reports of all important proceedings, such as lectures by experts paid for out of the funds of the Institute, annual meetings, etc.

It is not the fortune of every chemist to "marry a rich attorney's elderly ugly daughter," so many of us have to rely on what we earn to provide for the present and *future* wants of our wives and families, we must not look to the Institute to help us to higher remuneration, and therefore we should adopt the suggestion of A.F.W. and have a new Institute, a body to consider *our* interests *as well* as those of the public—a trades union if you will, to secure substantial benefits for chemists.

We can still support the Institute of Chemistry on "educational and ethical grounds," and do our utmost to maintain the dignity and welfare of the Institute, and prevent it so degenerating that a Fellow would leave, and put "not a FIC" or formerly F.I.C. on his professional circulars or stationery.

The fact that one hundred and eleven votes went against the council list should be a Mene Tekel to the council. "Must do something" is better than do nothing; it will be easy to increase the number of the opposition if the council do nothing between now and October to remove the causes of discontent.—I am, etc. W. JESSE LOVETT.

## THE MANUFACTURE OF SULPHOCYANIDES.

*To the Editor of the Chemical Trade Journal.*

Sir,—Having seen in your Journal of the 7th January an account of the manufacture of the sulphocyanides of certain metals from waste liquor, I should be much obliged if you would kindly inform me of the cost of manufacturing the sulphocyanide of barium.

Now, 11 tons of 10 oz. ammonia liquor produce (on an average) about 1 ton of sulphate of ammonia: and it says that in the production of 1 ton of $(NH_4)\ 2SO_4$, it should be possible to produce nearly 2 cwts. of ba. sulphocyanide. Now, what would be the cost of producing that amount of ba. sulphocyanide? That is to say, What would be the cost of the $Cu.SO_4$ and the $Fe.SO_4$ and the $Ba.S_2$, and the cost of evaporating the solution of ba. sulphocyanide (using coke)? also, How much $Ba.S_2$ ought to be used to combine with the copper sulphocyanide? And lastly, having experimented with some waste liquor, I found after adding the $Cu.SO_4$ and $Fe.SO_4$ and after filtering, the filtrate was a dark blood-red coloured solution containing the iron. What can be done with this? It does not say anything about it in the Journal. Also, What will the sulphocyanide of barium sell for per ton at present prices? Any information on this subject will be regarded as a great favour.—Yours truly,

ANXIOUS ENQUIRER.

[We print this letter in order to give an idea of the enquiries we are constantly receiving. While we are willing to give our readers every early jot of information we think of value to them, we hope we are not expected to teach them their business gratis. To those who can apply our hints, our early information will no doubt be valuable; those who cannot must make their enquiries a matter of business.—ED. *C.T.J.*]

## "THE PHILOSOPHER'S STONE."

A LECTURE on the "Philosopher's Stone" was delivered by Dr. Hürter, in Lacey-street Schoolroom, Widnes, on Monday evening, in connection with the Widnes Free Public Library. There was a large audience.

The lecturer, who commenced his interesting address by observing that once upon a time there was a small village situated near the shores of a beautiful large river, in a lovely country. The peaceful inhabitants of that village, most of them tillers of the soil, enjoyed themselves in the simple fashion of those times. To satisfy their wants there had long been built in the midst of shady grounds, close to the riverside, an inviting hostelry, where the inhabitants on holidays assembled to escape for once the drudgery of their everyday occupation, to enjoy a game or dance, but more particularly to taste of a special dainty, for which the hostelry was famous, and which was known by the name of Snig-pie. One day the peaceful inhabitants of that village were alarmed by the appearance of a stranger, who began to cut down their beautiful trees, and to erect structures of curious shape, of which the villagers had as good ideas what they were intended for as the man in the moon. By degrees a rumour went abroad that this stranger had found ways and means to make pure gold from salt. And, indeed, the stranger prospered. Rapidly the green fields and trees disappeared, the ground was covered with more gold factories, all of them turning salt into pure gold. The tillers of the ground lent a willing hand, and became workmen in these factories, receiving as reward part of the gold there made. The village, formerly unknown, increased into a large town of world-wide reputation, churches, schools, and other public buildings were erected, one of the finest being a town hall, the roofs of which sheltered an institution called a free library. Eminent citizens of the town were constantly endeavouring to supplant the old-fashioned enjoyments, such as the public-house offered, by more rational and more intelligent amusements, such as free lectures on various topics, and the people heartily supported their leaders. Such were the wonderful changes which were brought about by the introduction of this process of converting salt into gold. Some grumbling inhabitants said that the change did not prove a blessing altogether, and it could not be denied that little was heard now of the Snig-pie house, that the river was not now famous for its sparkling clear water, and that the town had a peculiar odour at times; but on the whole the people enjoyed their share of the gold in good health, thanks to the cares of their worthy chairman. Be that as it might, the things which the people of Widnes strove to obtain, wealth and health, were held to be indispensable for human happiness all the world over, and at all times men had endeavoured to gather riches and to preserve health, and long life to enjoy them. But not at all times were men satisfied to resort to such processes for obtaining gold as the people of this good country were now using, processes known by the names industry and thrift. About 300 years ago there were many people to whom these processes appeared to be too slow, and to taste too much of the well-known curse, "in the sweat of thy face shalt thou eat bread." These people looked out for a quicker and easier way of becoming rich, and they verily believed that there was such a way for obtaining gold, and not only for obtaining gold, but also for procuring health and life everlasting. And this was how that belief had arisen. Old philosophers had given it as their opinion that all metals were composed of only two or three things, and that the mixture of these things in any one metal might be so altered as to change it into another metal. These philosophers had long searched, and were reputed to have found, a material which should change the commoner metals, iron, copper, tin, lead, and mercury, into the precious metals silver and gold. This material was named the philosopher's stone, and the operation of changing one metal into another was called the transmutation of metals. But the process by which the philosophers had succeeded in making their wonderful stone remained a profound secret. They would readily perceive that in that theory there was hidden the prospect of an honest and easy way of getting rich quickly. There was nothing to do but to find, by fair or foul means, that secret of the philosopher's stone, and riches without bounds would be the reward. Curiously, history recorded many cases of men who were reported to have found the grand secret, and who had amassed fabulous fortunes, such as they only read of in Oriental stories. The lecturer then proceeded to quote some of the cases alluded to, observing that foremost amongst them all was the story of Nicholas Flamel, a Frenchman. He was born at Pontoise, in 1330, and lived in Paris, gaining his livelihood as a copyist. In 1357 he obtained a manuscript, engraved on a piece of bark, which he tried to decipher. Having spent twenty-one years of his life in a vain attempt to solve the riddle, he travelled to Spain, where he found in St. Iago de Compostella a learned physician, who translated the document and explained its mystery. It proved to be written by a certain Jew, Abraham, and addressed to his fellow Jews; and it yielded no less a secret than the preparation of the philosopher's stone. Flamel returned to France and set to work. In 1382 he was able to change mercury into silver or gold at his pleasure. He became enormously rich, and spent his riches for the benefit of his fellow-creatures. He built and endowed 14 hospitals, seven churches, and three chapels. Even as late as 1742 alms were distributed in Paris from funds which he left for that purpose. The year of his death was uncertain. Various other instances which are reported in history of persons having been possessors of the magic stone were given, and of the immense amount of money which they left when they died, the lecturer observing that it was no wonder, then, that all classes of people were anxious to obtain the great secret. Stories of such wealth so easily acquired were sufficient to interest any one, and, indeed, they found that in the 17th century the craze of the philosopher's stone had spread amongst all classes of the population of the whole of civilised Europe. What, they would ask, were the grounds for this universal belief in the possible existence of this mysterious substance? There were many reasons. Besides the well-attested stories of which he had just given a few, there were certain experiments easily performed which seemed to prove that one metal could easily be changed into another. Then there was a certain theory propounded by ancient philosophers, as to the composition of matter, which satisfactorily explained these changes. Last, but not least, the belief in the existence of the philosopher's stone was older than Christianity, and had taken deep root in the minds of superstitious people. After various other remarks, Dr. Hürter gave a translation of a prescription for the making of the philosopher's stone, to which he said he was kindly indebted to Mr. Gibson Smith, of Warrington; and concluded his remarks by various interesting experiments, showing by what chemical experiments people could be made to believe that the adepts really had in their possession the magic stone. He also touched upon the many discoveries which had been made by all chemists whilst looking for this phantom.

## AIR POLLUTION BY MANUFACTORIES.

BY R. FORBES CARPENTER.*

IN bringing this subject before you to-night I know I shall be treating of evils with whose effects we are all more or less well acquainted, but of the causes of those effects knowledge is less widely spread, and the public has largely yet to learn what alleviation of the evils it may reasonably expect, and still more what in our present state of knowledge it would be unreasonable to look for in the way of complete abolition of air pollution.

I have specially confined the title of my remarks to "Air Pollution by Manufactories," as I do not propose to treat at any length, though I must allude to it, the pollution of air by the aggregation of human beings in towns and villages. These subjects, though intimately connected, are capable of being discussed separately. Both are roughly divisible first under two heads—

*(a)* Air pollution which is injurious to vegetation, stone and metal work.

*(b)* Air pollution which is injurious to the health of human beings.

In enlarging on the first of these heads you will not be surprised to learn that in places not exclusively the centres of chemical manufacturers, such as Widnes and St. Helens, coal smoke is the principal cause of offence, and the important factor that we must bear in mind in estimating the injury which will ensue from this cause is the quantity of coal burnt per acre in a given time. In this respect you will easily see that in centres of industrial production such as those with which Prestwich is on all sides surrounded,

* A Lecture delivered at Prestwich, by R. Forbes Carpenter, Esq., Government Inspector of Alkali Works.

ctories played a more important part than dwelling-
But here it will be best to get a clear understanding
reasons why coal smoke is injurious to trees and
ion generally. Firstly, the deposit of fine soot on the
nd twigs absolutely stops the breathing passages of
nt and so lowers its vitality; but secondly, because
oke is acid in its character, and the rain and dew
ng and dissolving the acid, water the plant with what,
s day by day, and month by month, affects in time
rdiest and strongest of our plants and trees; and
, these two evils combine, the soot acting as a sponge
rb the acid vapours and concentrate their evil effects.
re two lists of the order of sensitiveness of trees to
apours. The first list relates to muriatic acid, to
tree life is exceptionally sensitive; the second to the
f coal smoke. The order is not the same, some kinds
s resisting one kind of acid better than another.
el, Oak, Beech, Birch, Maple, Hawthorn, Elm, Larch,
oplar, Fruit Trees, and Alder. 2. Pine, Scotch Fir,
Hawthorn, Beech, Birch, Fruit Trees, Hazel, Horse
ut, Oak, Ash, Poplar, and Alder.
let us go back a moment and see why I named aggre-
of manufactories as a more important factor than
dwelling-houses. The observation of all of you will
a that the density of the smoke coming from a factory
ey is far greater than that from a house chimney. In
oke Abatement Exhibition in London and Manchester
1-2, there were comparative trials of appliances for
tion and consumption of smoke in house grates and
fires, and various standard shades of blackness were
d by Mr. Kinnear Clark, the engineer in charge of the
nents, who states: "It is worthy of observation that
he densest smoke shades that have been recorded, in
ts of grates and stoves, are light comparatively, when
oke of industrial establishments and of steam boilers
n into consideration." Again, you probably do not
o be told that the cause of the acid character of coal
or of the smokeless but still acid vapour from burning
e, is the sulphurous acid produced by the burning of
lphur originally contained in the coal or coke.
the percentage of sulphur contained in coal varies
he locality from which the coal comes, but it is
the case that the small coal, which contains
dross and impurities generally than the large,
o richer in sulphur impurity. This kind we
is largely used in furnace fires, while the household
re fed by large coal, containing, therefore, less impuri-
It is also the fact that in a manufacturing locality more
burned in the factories in the same space than would
rned were that space occupied by dwelling-houses.
ow you have my reasons for saying that the evils of
llution are more intense in a manufacturing district
n one simply densely populated and non-manufacturing.
e summarise them:—1, more coal is burned per acre;
coal is more impure than that which would be used
sehold consumption; 3, the smoke shade is darker,
soot being produced; 4, more sulphurous acid is
d—this follows from reason 2; but both reasons 3 and
ntensified in their action by the greater density of the
, and its less diffusion into the atmosphere than when
es from a number of small chimneys. Density may
become an all important consideration under very
circumstances.
late much esteemed chief inspector under the Alkali
Dr. Angus Smith, who lived so many years in Man-
r, was the first who drew attention to this all important
. In report after report he yearly enlarged upon the
tance of establishing standards of purity of air, which
l be rigorously watched and maintained by local
rities.
will be well for us to consider in actual figures the
nt of air pollution arising simply from the sulphur
nt in coal. An analysis of good Wigan coal, such as
e used in house fires, shows in 100 parts: carbon 82,
gen 5·5, nitrogen 1·6, sulphur 1·6, oxygen 5, ashes 4·3;
hole of the sulphur is happily for us not given off as
urous acid on combustion, but, taking a moderate
ate, 8lb. of sulphur in every 100lb. of coal burned
es as sulphurous acid. This is the acid we are all
ar with, given off when brimstone is burned; mixed
ir it slowly tends to oxidise to a still more pernicious
of acid, sulphuric acid, familiar to us in its concentrated
under the name of oil of vitriol. In 1885 the coal con-
l in Great Britain was 126,000,000 tons, which would
ce about 3,000,000 tons of oil of vitriol. Thanks to our position near the Atlantic, favourable for development of wind, much is diffused, but much of this is dissolved by the rain and showered down upon us. As Mr. G. E. Davis put it in a lecture, given before the Manchester and Salford Noxious Vapours Association, suppose a canal was cut in the soil of a uniform width of 20 feet and depth of 5 feet, the canal would have to be more than 110 miles long to hold this quantity of vitriol. In 1886 it is estimated that the salt works in Cheshire consumed 750,000 tons of coal. This, at the estimate made by scientific witnesses before the Royal Commission on Noxious Vapours, would give out 22,500 tons of sulphurous acid, or in oil of vitriol nearly 100 tons daily in the limited districts of Northwich and Winsford.

In Widnes in 1887 960,000 tons of coal were consumed, giving at the same estimate 120 tons of oil of vitriol a day to be deposited in the surrounding districts, or more than twenty times the amount escaping from all the vitriol works in this most "chemical" of districts.

We have now a conception of the magnitude of the evil, of its widespread nature, and we can also see that were there no question of black coal smoke to engage our attention, were the air in manufacturing districts as clear as it is by the sea, we should still find the products of combustion have colossal power for mischief, as the deadly (I speak here of vegetation) sulphurous air still lurks in the invisible gases.

Now let us turn our attention for a time to the other portion of the evil—black coal smoke. This smoke in Mr. Davis's description of house fire smoke consists "of particles of carbon, vapours of hydrocarbons or oils, similar in kind to paraffin oils, sulphuretted hydrogen, sulphurous acid, and other not very savoury bodies. This mixture all escapes into the chimney, some of the heavier particles are there deposited, and we all know them as soot, which on account of its containing some 4 per cent. of sulphate of ammonia is very generally used as a manure." Mr. Charles Estcourt in another lecture of the same series, "Why the air of Manchester is so impure," states that one ton to every hundred tons burned in the factories of Manchester remains in the air as soot from black smoke. We have no need to exercise our imaginations on the all-pervading nature of soot, as in the case of the invisible but no less injurious sulphurous acid. So I will hasten over this portion of my subject, merely stating as an effect, not at first sight so much in evidence, the mere fact that over the manufacturing districts of Lancashire and Yorkshire such a pall of black vapour hangs which must materially lessen the power of the sun's rays in quickening vegetable life; this quite apart from the question of fogs. After a prolonged drought and a period of high barometer, when there is little or no wind, the way in which the air shows it is loaded up with impurities becomes very apparent. Hence, when the air is washed by rain after long drought, it is much clearer and is better adapted for photographic purposes than before, but the effect of such rain on grass, washing off as it does from the trees the accumulation of impurities, is most deleterious. The rain of Manchester, as shown by Dr. Smith, is distinctly acid in its reaction (rain containing 40 parts acid per million being utterly destructive to all tree vegetation, and rendering the growth of grass impossible), and so grass under trees is with us notoriously a thing of precarious existence. Mosses, which seem to thrive in dilute acid, replace the grass in the centres of such towns as Manchester.

Where are we to look then for remedies for these evils of gigantic growth and of such widespread nature. Let us begin with the problem of prevention of black coal smoke. In factories burning coal there may be both steam boiler fires and furnace fires to be fed. As regards the latter class of furnace, many will remember the frequent summonses issued against an ironworks in Pendleton for emission of black smoke some years ago.

The problem in furnace fires where metallurgical operations are carried on, of how to prevent the production of any smoke at all, is not an easy one. Such operations require the forcing of the heat at particular stages, more or less rapidly, heavy supplies of coal are added to an already red-hot furnace, with the result that distillation of the fresh coal proceeds with enormous rapidity, and it is most difficult to supply air in sufficient quantities and in proper admixture for complete combustion before the chimney is reached. Even here much has been done and much can be done by the apparatus known as the Frisby Coal Feeder. I have seen it in most successful operation in the furnaces used in the manufacture of bichromate of potash, where very great heats are required, and where the operations at times require forcing. The bottom of the furnace is so constructed that

in the centre of the bars is a circular space some 18in. to 2ft. diameter. By an ingenious mechanical arrangement an iron shield which covers this circular space makes room for a cylinder filled with fuel; at the bottom of the cylinder is a piston, which, by continuing to work the rack, moves upwards, forcing the coal upwards into the bottom of the fire; when simply the rack is reversed the cylinder returns to be filled, the shield follows, takes its place, preventing the return of the coal. No one who has seen this form of feeder but has been surprised at its efficacy in maintaining strong heats and in completely preventing emission of black smoke. Again, in the future we may reasonably hope to see the extension of the use of "producer gas" in metallurgical furnaces. In Sheffield, in the large steelworks, gas as fuel has largely replaced the direct use of coal or coke. But while the old form of Siemen's gas producer was prohibitive for all but large manufactories having plenty of ground space at their command, the newer forms introduced by Mr. Wilson, Mr. Dowson, and others, are small and compact and can be applied in small works, and little ground space is needed. Of the former of these, at any rate, I can give a good account, having seen them in practical use for the last six years. For many years the introduction of producer gas as a fuel has not made very rapid progress, it being found that the economy over coal did little towards paying interest on the increased outlay in plant. Unless the principle of regenerative furnaces is adopted, the use of producer gas, except for special purposes, has not resulted in marked gain, but it is a reasonable hope to entertain that if pressure be put on manufacturers to prevent emission of black smoke, a gradual replacement of coal fed furnaces by those heated by producer gas will follow. (I shall touch upon the subject later on in my paper.)

We now come to the more common evil of black smoke from boiler fires, and here I say at once the evil is one that can be, and should be, prevented. The cause in the majority of cases is that too much coal is attempted to be burned in one fire in a given time, with the result that a certain proportion is not burned at all, but issues from the chimney in dense volumes of smoke at every firing up. I cannot insist too strongly upon the importance of this fundamental fact. The effect of the best known systems of mechanical stoking may be all neutralised if more than a due amount of coal be forced through the apparatus per hour. I have for years past seen a very good instance of this. At Bradford, Mr. Samuel Cunliffe Lister, who is the owner of the large and well-known silk mills at Manningham, has been time after time fined by the Corporation for contravening the borough regulation as to emission of black smoke. The chimney is large and prominent on the crest of the hill on which the works are situated. I have had occasion during the last two years to visit the mills in the course of my official duties, and the engineer of the works took me into consultation on the knotty problem of smoke prevention. He told me Mr. Lister had spent a large sum of money in trying the various mechanical stokers, but with little success, that it would be cheaper for him to revert to ordinary hand firing and pay the fines whenever summoned, but that he felt his public responsibility in the matter. Inquiry and inspection soon showed me the root of the evil lay in insufficient boiler space, although there were nearly thirty boilers in the works. Three new boilers have since been added, partly for increased work, and the balance is not yet restored. I found all the well-known systems of mechanical firing either had been tried or were in operation, but the volumes of black smoke pouring continually over the country round showed me the difficulty had not been met, hardly even palliated. There has recently been developed at Barrow-in-Furness a new system of smoke consumption in boiler fires, evaporating one-fourth more water from one-third less fuel, but on referring this to Mr. Lister's engineer he wrote to me saying that their requirements necessitated their burning double the amount of coal per hour to the utmost that had been attained under this system (five tons per day per boiler, in place of two-and-a-half tons per day). Until the number of boilers is increased I do not expect to see less smoke issuing from the chimney at Manningham.

*(To be continued.)*

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The Willenhall Sewerage Scheme.—Tuesday, the 10th April, has been appointed by Major-General C. Phipps Carey for an inquiry, at the offices of the Local Board, into the application by the Board for power to borrow £17,000 for the purpose of carrying into effect the scheme of sewerage which has been approved by the Board.

# Trade Notes.

Sulphate of Alumina.—In our report of the Kurtz *v.* Spence case it appears to have been stated by Mr. Kynaston that Messrs. Kurtz have made "between 80,000 and 100,000 tons," at least so it reads in the shorthand notes. We have been informed, however, that Mr. Kynaston stated it to be betwixt 80 and 100 tons. Our readers will perhaps make this correction.

The Phosphate Meal Convention.—The following facts give an additional proof that the price conventions which have lately been so popular among manufacturers lead to extensive complaints on the part of consumers. All the German manufacturers of phosphate meal, which is in such large request as a manure, have come to an agreement whereby they are mutually bound to sell phosphate meal during the whole of the year 1888 and afterwards at exactly similar prices proportionate to the quantity of phosphoric acid which the meal contains. Against this measure no special complaint can be made, but the sore point is that all phosphate meal, no matter where it is produced, is reckoned on the basis of the freightages from the station Wanne in Westphalia. Whoever, therefore, lives in the neighbourhood of a phosphate meal factory must pay, in addition to the carriage, the difference of the carriage between his own residence and Wanne. This causes an increase in the cost of the goods, which falls particularly heavily on consumers in North and East Germany.—*Kuhlow's Review.*

A German Wine Circular.—The following letter from a German wine exporter is being circulated among wine merchants and others in India, Ceylon, and other parts of the East, and perhaps in Europe also: "Your esteemed firm being mentioned to us as importing large shipments of cheap champagne or sparkling hock, we beg to address directly our offers to you. We can highly recommend you our cheapest quality at 12s. 6d. net cash per dozen quarts (Saumur bottles, which are smaller, can be delivered with a little reduction), packing included, carriage, freight, and insurance, Rotterdam or Antwerp, which is sold chiefly in your market. We beg to observe, moreover, that you can have this wine made up with any brand you wish. We shall be pleased if you will feel inclined to make a trial, and remain, dear sir, yours truly, ——— P.S.—If you require some other goods which you know to be of German origin, we are at your disposal." Thus, a quart bottle of champagne "with any brand you wish," carriage, insurance, and freight paid, is offered for 1s. 0½d. while the usual retail price in the East of champagne is five and six rupees, or $2½ to $3 per quart.—*Times.*

Andersonian Chemical Society.—The weekly meeting of this society was held on Friday evening in last week, Mr. James Robson in the chair. Mr. A. B. Robertson, demonstrator of chemistry at the Glasgow Academy, read a paper on "Plant Analysis," treating fully of the quantitative estimation of the opium and cinchona alkaloids, amines, chlorophyll, and pectose. A vote of thanks was accorded the essayist.

Stoppage of Ironworks.—The Elba Iron and Steel Works, Gowerton, belonging to Messrs. Wright, Butler, and Co., were closed yesterday, and all the workmen were paid off, in consequence of the continued depression in trade. The extensive ironworks of the New British Iron Co., at Ruabon, are also permanently closed. Several hundred workmen are thrown out of employment by these stoppages, and many of the men are emigrating.

Chloride of Nitrogen.—What has heretofore been called chloride of nitrogen Dr. Gattermann, of Göttingen, proved, some time ago, to be really a varying mixture of several chlorides. There is now reported the successful preparation and analysis by the German chemist of pure trichloride of nitrogen. As common gunpowder is to dynamite so is dynamite to trichloride of nitrogen, in proportion is this so much the more terrible than that. The yellow liquid needs not, like glyceryl nitrate or picric acid, to be placed on an anvil and to get a mighty blow from a hammer to make it explode. Sufficient to cause it to blow itself and all about it to perdition is the brush of a bluebottle's wing or merely a flash of sunlight. Indeed, to burn a piece of magnesium ribbon near it is enough to make the yellow oil explode.

ROM PETROLEUM.—In Glasgow, a committee of the Council has been appointed to inquire into the of the production of gas from petroleum, and ents are now being made. There is little doubt t the gas companies are likely to have a competition electric light as far as illuminants are concerned, may best meet it either by endeavouring to cheapen of the production of gas, or by themselves commen- upply electricity for lighting purposes—or by both —so that the economical use of both gas and electri- ht be fostered.

RIDE OF NITROGEN.—Dr. Gattermann, whose venture- periments have had so successful an issue, has not with impunity. It is regrettable to learn that he ve up, for a time, all further work upon this explo- eyes and nerves having been grievously injured by nt experiments. Yet he has been more fortunate edecessors in the same work. Those familiar with s of Davy and Faraday are not likely to forget the ccidents that happened to them when experimenting loride of nitrogen. Much less is it likely to be n that the discovery of this dangerous body in 1811, ng, cost that distinguished chemist one of his eyes e of his fingers, doing him much bodily harm besides. stance has been usually prepared by leading chlorine arm solution of salammoniac. In laboratories, the n of a tiny drop of the liquid is secured by touching feather moistened with turpentine and attached to of a long wand such as a fishing rod. Its suppleness e arm from the shock.

LD MEDAL FOR LIQUID FUEL.—A committee of ex- now sitting at the Petroleum Exhibition at St. rg to determine which system of burning liquid l receive a gold medal. Unfortunately, English in- have not taken the trouble to send their appliances s country, so that the gold medal will not fall to us; atever its fate, the illustrated report that will after- e published by the Imperial Technical Society in o the experiments conducted with the appliances l ought to be of great practical value. The pre- f the committee is M. Gulishambaroff, the author of work on liquid fuel yet published. In it he gives ory of the liquid fuel inventions in every country. hirty different systems are shown at the exhibition, ne of these contain improvements of an important r. For instance, one of the chief difficulties in- have to contend with has been the destructive f the intense heat of blazing oil on the boiler tubes. bviated in a new Russian system shown, by deflect- flame upon the fire-clay bottom of the furnace, a working up under the bottom of the latter and g against the deflected flame, which it impels owards the boiler. Another defect of the pulverisers that sometimes the wind resistance encountered by ves drives them back from the furnace, and not long ngine driver and his assistant on the Transcaucasian were roasted to death by an accident of this kind. bviated by a new invention, consisting of a safety hich acts automatically when the oil blower works uch improvements are worthy of the attention of erested in liquid fuel in this country, some of whom worse than pay a visit to the exhibition.

BIMETALLIC CONFERENCE.—It is notified that the ter and Salford Trades Council, which has a con- with trades unions representing upwards of 600,000 men, has just appointed its president, secretary, and other members as delegates to the Bimetallic ce to be held in Manchester on April 4.

ELENS WATER STATISTICS.—The Water Engineer pumping returns as follows:—Eccleston Hill, total weeks, 21,931,294 gallons; daily average, 626,608 last month's daily average, 573,653. Whiston, total for five weeks, 21,846,560 gallons; daily average, last month's daily average, 590,931. Sutton-road for five weeks, 21,690,000 gallons; daily average, gallons; last month's daily average, 616,171 gallons. y, total delivery for five weeks, 25,097,500 gallons; rage, 717,071; last month's daily average, 607,460. n old water, delivery for five weeks, 4,106,200; daily 117,320; last month's daily average, 160,011 gallons. he month the total quantity of water delivered was 4 gallons, which had been distributed to an estimated on of 68,218 persons, averaging 35·29 gallons per less charged by meter, 19·29 gallons. There had constant supply. The comparison of daily averages showed that the average supply from all the works above mentioned was 2,548,226 gallons, against 2,421,190 last month. Rainfall for month ending February 29th, was ·61 inches; corresponding month last year, ·61 inches.

THE AUSTRIAN SUGAR "RING."—A Vienna correspondent telegraphing on Friday, says:—The sugar manufacturers of Austria have decided to establish a cartel, or minimum price, for the sale of their products. This is a great breach of faith with the public. As the *Wiener Tagblatt* points out, the Austrian refiners—who are about three hundred in number—receive between them export bounties amounting to 5,000,000 fl. annually. This is paid them in order that foreign buyers may get sugar cheaper in Austria than elsewhere. Not satisfied, however, the "Sugar Ring" now proposes to raise the price of sugar by 2 fl. per metrical quintal. As 2,500,000 quintals are consumed yearly in Austria, the effect of the cartel will be to add another 5,000,000 fl. to the refiners' bounty.

SANITARY ENGINEERING.—The Home Counties District meeting of the Association of Municipal and Sanitary Engineers and Surveyors was held last week at the Town Hall, Maidstone, the members being welcomed by the Mayor (Mr. R. Waterman) and several members of the Corporation. Mr. Joseph Gordon, M.Inst.C.E., the president of the Association, occupied the chair, and there was a large attendance of members. The principal business of the meeting was the reading of an elaborate paper by Mr. F. J. C. May, C.E., the Maidstone borough surveyor, entitled "Sanitary and other improvements within the borough of Maidstone during the last ten years." Mr. May dealt at length with the question of the disposal of sewage, the granolithic paving, the erection of the infectious hospital, the substitution of granite for Kentish rag in roadmaking, and also with the proposed improvement at the tanks. These were to be divided into 20 equal sized compartments, with a narrow channel running down the centre. At many riverside places the acquisition of a sewage farm was deemed necessary for the purification of the liquid sewage, which was filtered through the land before being discharged into the river, but at Maidstone the plan adopted was to separate the solid matter from the effluent water, which was then treated chemically. Hitherto the process had not been successful, complaints being made as to the pollution of the river. At the close of the meeting the members of the Association were entertained at luncheon by the Mayor, and subsequently they proceeded to the sewerage tanks at Allington, where the pressing process was explained. Later in the day the prison, museum, and infectious hospital were visited, and in the evening the Association dinner was held at the Mitre Hotel.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

THERE is still no break to report as regards the dulness so long pervading the market. The movement continues a declining one chiefly, with very little to the other count as a set-off. Bichromates have been in more active demand, especially for home deliveries; but there is here still a big margin of deficit for the making up if the market would brace itself a bit. Rather a biggish shipment of Scotch sulphate of ammonia has just been fixed at current figures for the supplying of a consignment to the West Indies, and this has had a slightly arresting effect on the sliding disposition of the article. Previously it had been bought down to £11. 15s., but under this partial baring of supplies in sellers' hands price has recovered, and for prompt £11. 17s. 6d. is procurable, with as high as £12 talked of, but not verified. Deliveries first week of April can be arranged at £11. 15s. f.o.b. Leith. Most of the heavier chemicals are weaker, with threats of further breaks in prices. Bleaching powder has lost if anything, and chlorate of potash alone is the turning better. General prices current are:—Soda crystals, 40s. net Tyne; alum in lumps £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid £42 net Glasgow; soda ash, 48/52°, 1d., less 6 % Tyne; caustic soda, white, 76°, £8. 5s., 70/72°, £6. 15s., 60/62°, £5. 15s., and cream, 60/62°, £5. 15s.; bicarbonate of soda, 5cwt. casks, £5. 15s., and 1cwt. casks £6 net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 20s. 6d., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 12s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 % and

6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 10½d.; chlorate of potash, 5¾d., less 5 % any port; sulphate of ammonia, £11. 15s. to £11. 17s. 6d. f.o.b. Leith; sulphate of copper, £22; paraffin scale, hard, 2 7/16d., soft 2d.; paraffin wax, 120°, semi-refined, 2 11/16d.; paraffin spirit, 5d.; burning oil, 6d.; lubricating oil, 885°, £6. 10s. to £7; 890/95°, £7. 15s. to £8. Western imports have included 1,439 tons copper ore, 1,100 tons brimstone, 1,000 barrels oil (American), 99 tons logwood, and 2,132 barrels resin. Greenock: Sugars, 1,041 bags and 10,375 baskets.

## THE LIVERPOOL MINERAL MARKET.

The market has ruled steady during the week, and there is no material alteration to report in prices. Manganese arrivals continue small, and prices are without change. Magnesite (containing 98 per cent. of carbonate of magnesia) without alteration at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. Bauxite: The demand is brisk, but prices are unaltered at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton. French Chalk: Arrivals have been materially reduced and prices are still stronger, sales having been made at an advance of 5s. to 10s. per ton—85s. to 90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) continues scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumicestone in fair inquiry; ground, £6. 10s. to £7; specially selected lump, finest quality, £10. to £10. 10s. Iron ore: The improvement has been maintained; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Mica, ground, £50. Emerystone is inquired for at £5. 5s. to £5. 15s. for lump, and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore: The demand last reported continues, and prices are firm. Antimony ore firmer; £16 to £22 for fair quality. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8.

## THE LIVERPOOL COLOUR MARKET.

Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian, red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald Green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## LIVERPOOL CHEMICAL MARKET.

Chemicals have ruled steady this week, and there is little, if any, change to report in prices. Soda-ash weak. Caustic soda: 60 % white, £6; 60 % cream, £5. 18s. 9d.; 70 % white, £7; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d.; Bicarbonate, £6. 10s.; Nitrate of soda: There is little improvement at 9s. 6d. to 10s. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d., and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 21s. 6d. Bichromate of potash 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £10. 17s. 6d. to £11. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, £22 to £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic), strong, at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia, white, 22s. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc, £18.

## MISCELLANEOUS CHEMICAL MARKET.

The general tendency of prices is indicative of the present general depression of trade, and concessions continue to be made wherever possible in order to induce business. Prussiate of potash has again given way in spite of the efforts made to keep up the price by the convention of manufacturers. Notwithstanding a firmness in the lead market the prices of acetates and nitrate of lead are weak, owing to the small demand for these products; and sulphate of copper is in a similar position. Soda-ash, crystals, and caustic soda are moving off tolerably well under prior engagements, but business on the spot is very quiet, and the prices of caustic soda are easier. Bleaching powder is a shade lower again, but makers are very well engaged with orders in most cases. Carbolic acid crystals are inclined to advance further, with the prospect of increased demand and short supply of crude. Zinc and tin salts are maintaining prices, and the former are meeting with good demand. Potash, muriate, carbonate, and caustic are in fairly good request at current prices. Oxalic acid is dull, and the price is in buyers' favour. Acetates of lime are still quiet.

## THE ALKALI TRADE.

Everywhere the markets are dull. From every district we hear that there is a further tendency to a fall in prices amongst the whole range of alkali products. Correspondents tell us of the extremely low prices realised for soda-ash, and of the almost constant "cutting" which goes on in caustic soda, to the detriment of the whole trade. Bleaching powder is dull, but prices are maintained for the time. Saltcake is still flat and not easy of disposal; we hear that considerable quantities are sent to Belgium from London at a price which scarcely realises £1 per ton at the works.

## THE TAR PRODUCTS MARKET.

There is so little doing in Benzol that it is impossible to say whether it has any price at all. Speculators seem to think that if they can keep the price inflated for another two months everything will go well, as the summer's small make is approaching. The realisation of this wish is, however, very much open to doubt. Carbolic acid (crude) and anthracene still keeps firm, and 1s. 4½d. for A and 1s. 2d. for B is about the value to-day; it is quite certain that nothing can be purchased under these prices. Pitch has been moving off well during the past few weeks, but prices cannot be said to have hardened.

## THE SULPHATE OF AMMONIA MARKET.

There is as yet no more hopeful outlook for this market, the weather being decidedly against heavy purchases either at home or abroad. Still it must not be overlooked that

ry considerable quantities have been shipped to unaffected by the severe weather during the past London values, both of Beckton and outside makes, aken as £12. 2s. 6d., Hull at £11. 17s. 6d., and Leith rpool £11. 15s. The Easter holidays now approaching oubt be productive of a few quiet days, but forcing not do either the market or the individual sellers

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

Sons, Castleford, Yorkshire, earthenware manufacturers.
TT & Sons, Warminster, brewers and maltsters.
STER and E. J. TONKS, Erdington and Aston, artificial manure turers.
AN & Co., Manchester, mechanical engineers, as far as regards ewart.
rke, Derby, manufacturing and consulting engineers.
Co., Kingston-upon-Hull, aerated water manufacturers.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

loss, & Co., Swanmead, Bermondsey, London, size and makers.
ETOL, Boston, mineral water manufacturer.
JOHN, New Hey, Rochdale, sanitary tube and fire brick turer.

#### Adjudications.

JOHN, New Hey, Rochdale, sanitary tube and fire brick turer.
DAVID, Swansea, chemist and druggist.
RTOL, Boston, mineral water manufacturer.
THUR, jun., CRIPPS, ISAAC, and CRIPPS, HENRY (trading as Ross, & Co.), Swanmead, Bermondsey, size and gelatine

#### First Meetings and Public Examinations.

JOHN, New Hey, Rochdale, sanitary tube and fire brick manu- April 6, Town Hall, Rochdale. April 17, Town Hall, Oldham.
ZACHARIAH, Denton, Lancashire, hat manufacturer. April 5, ail, Ashton-under-Lyne.
W. J, Rainham, Essex, chemical manufacturer. April 5, y-street. April 7, Shire Hall, Chelmsford.
JOHN, and CARR, GEORGE (trading as Quinlan, Carr, & Co.), n, West Riding, and Lancaster, indiarubber manufacturers and oofers. First meeting, April 5, Official Receiver's Office, ster.

#### Notices of Dividends.

NRY ALEXANDER (trading as H. A. Pope & Co. and Pope s), Swansea, mineral water manufacturer. First and final d of 1¾d., March 28, Official Receiver's office, Swansea.

# The Patent List.

*llowing List has been compiled expressly for* THE AL TRADE JOURNAL *by G. F. Redfern and Co., Patent 4, South Street Finsbury, London, and at Paris and*

APPLICATIONS FOR LETTERS PATENT.

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**Boiler Cleanser.** J. W. Taylor. 4066. March 16.
**Valves.** J. Lancashire. 4068. March 16.
**Safety Lamps.** J. Müller. 4072. March 16.
**g Designs on Glass.** A. D. Brogan and A. M. Malloch. larch 16.
**Belting.** R. Simpson. 4079. March 16.
**Cotton, Wool, and other Materials.** G. White. 4081. 16.
**Alloys.** J. C Bull. 4086. March 16.
**ting Machines.**—(Complete Specification.) J. H. Newton. larch 16.
**rs.** F. H. Street and C. Ellis. 4103. March 16.
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**Storage Batteries.**—(Complete Specification.) W. P. Thompson. 4275. March 20.
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**Burglar-resisting Safes.** T. Fletcher and G. Cawley. 4283. Mar. 20.
**Apparatus for the Manufacture of Monocarbonate and Bicarbonate of Soda.**—(Complete Specification.) M. R. Wood. 4284. March 20.
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**Cooling and Desiccating Milk.** M. Malcomson. 4423. March 22.
**The Treatment of Metallic Ores.** G. J. Atkins. 4430. March 22.

# New Companies.

BENTHAM GAS COMPANY LIMITED.—Capital, £2.000 in £5 shares.

CONTINENTAL PNEUMATIC TUBE COMPANY LIMITED.—Capital, £60,000 in £5 shares.

ELANDSFONTEIN GOLD MINING COMPANY LIMITED.—Capital, £150,000 in £1 shares.

GIBSON, HOGG AND COMPANY, THE BURTON PHARMACY COMPANY LIMITED.—Capital, £5,000 in £5 shares.

GOLD FIELDS OF NORTH QUEENSLAND LIMITED.—Capital £100,000 in £1 shares.

HANLEY DRUG COMPANY LIMITED.—Capital £5,000 in £1 shares

HEWITT BROTHERS LIMITED, BREWERS.—Capital, £100,000 in £100 and £10 shares.

JULIEN ELECTRIC COMPANY LIMITED.—Capital, £100,000 in £10 shares.

PEOPLE'S BREAD COMPANY LIMITED.—Capital, £100,000 in £1 shares.

ROCKWELL SILVER MINES LIMITED.—Capital, £175,000 in £1 shares.

SCHANSCHIEFF ELECTRIC LIGHT AND POWER COMPANY LIMITED.—Capital, £200,000 in £5 shares.

SPIROMETER COMPANY LIMITED.—Capital, £10,000 in £10 shares.

SPRINGWELL BREWERY COMPANY LIMITED.—Capital, £150,000 in £10 shares.

TARAPACA WATERWORKS COMPANY LIMITED.—Capital, £400,000 in £10 shares.

THRELFALLS' BREWERY COMPANY LIMITED.—Capital, £600,000 in £10 shares.

D. WATNEY AND SON LIMITED, BREWERS.—Capital, £200,000 in £10 shares.

WEDDLE AND DENNIS LIMITED, ENGINEERS.—Capital. £5,000 in £5 shares.

# PRICES CURRENT.

[THURSDAY, Mar. 29, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are f.o.r. at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... per cwt. | 0 | 9 | 0 |
| ,, Glacial ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... per cwt. | 0 | 11 | 6 |
| Chromic 82 % ... per lb. | 0 | 0 | 6 |
| Fluoric ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... per lb. | 0 | 0 | 2¼ |
| Nitrous ... ,, | 0 | 0 | 2 |
| Oxalic ... ,, | 0 | 0 | 3½ |
| Picric ... ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) ... per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) ... ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ,, | 0 | 1 | 6½ |
| Arsenic, white powdered... ... per ton | 10 | 12 | 6 |
| Alum (loose lump) ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, ·880=28°... ... per lb. | 0 | 0 | 3⅛ |
| ,, =24°... ,, | 0 | 0 | 1⅝ |
| ,, Carbonate ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... per ton. | 48 | 0 | 0 |
| ,, ,, (pure) ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 2 | 6 |
| ,, ,, (grey), Hull ... ,, | 11 | 17 | 6 |
| Aniline Oil (pure) ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ,, | 0 | 0 | 8½ |
| Antimony ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... per ton | 7 | 15 | 0 |
| ,, Carbonate (native) ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 %... ... ,, | 7 | 6 | 3 |
| ,, Liquor, 7 % ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... per lb. | 0 | 0 | 9 |
| Magenta ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ...per gallon | 0 | 3 | 4 |
| ,, 50/90 ,, ... ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 3 |
| ,, (crude 60°) ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 2½ |
| Coke-oven Oils (crude) ... ,, | 0 | 0 | 1⅝ |
| Copper (Chili bars) ... per ton | 80 | 2 | 6 |
| ,, Sulphate ... ,, | 22 | 0 | 0 |
| ,, Oxide (copper scales) ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 85 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ... ,, | 15 | 15 | 0 |
| ,, Litharge Flake, ex ship ... ,, | 16 | 10 | 0 |
| ,, Acetate (white) ,, ... ,, | 26 | 15 | 0 |
| ,, ,, (brown) ... ... ,, | 22 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 17 | 15 | 0 |
| ,, Nitrate ... ,, | 23 | 0 | 0 |
| Lime, Acetate (brown) ... ,, | 9 | 2 | 6 |
| ,, ,, (grey) ... ,, | 13 | 15 | 0 |

| | £ | s. | d. |
|---|---|---|---|
| Magnesium (ribbon and wire) ... per oz. | 0 | 2 | 3 |
| ,, Chloride ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ,, | 17 | 10 | 0 |
| ,, Borate ... per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ...per gallon | 0 | 2 | 1 |
| Naphtha (Wood), Solvent ... ,, | 0 | 4 | 1½ |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 8 |
| **Oils:—** | | | |
| Castor ... per cwt. | 1 | 3 | 6 |
| Cotton-seed ... per ton | 21 | 0 | 0 |
| Linseed ... ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ...per gallon | 0 | 0 | 6⅛ |
| ,, American ... ,, | 0 | 0 | 6⅛ |
| Potassium (metal) ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... per cwt. | 0 | 16 | 6 |
| ,, Chlorate ... per lb. | 0 | 0 | 5⅜ |
| ,, Cyanide, 98 % ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 10 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 15 | 0 |
| ,, Nitrate (refined) ... per cwt. | 1 | 2 | 6 |
| ,, Permanganate ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... per lb. | 0 | 0 | 6⅛ |
| ,, Sulphate, 90 % ... per ton | 10 | 0 | 0 |
| ,, Muriate, 80 % ... ,, | 8 | 10 | 0 |
| Silver (metal) ... per oz. | 0 | 3 | 7⅛ |
| ,, Nitrate ... ,, | 0 | 2 | 7⅛ |
| Sodium (metal)... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 16 | 3 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 11 | 3 |
| ,, ,, (Soda Crystals) ... ,, | 2 | 7 | 6 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ,, | 19 | 10 | 0 |
| ,, Chlorate ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... per ton. | 30 | 0 | 0 |
| ,, Bichromate ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda)... per ton | 8 | 0 | 0 |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 5 | 0 |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 13 | 9 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 12 | 6 |
| ,, Bicarbonate ... ,, | 5 | 5 | 0 |
| ,, Hyposulphite ... ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 ... ,, | 10 | 0 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 | 3 |
| ,, Nitrite, 98% ... per ton | 28 | 0 | 0 |
| ,, Phosphate... ,, | 16 | 10 | 0 |
| ,, Prussiate ... per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake)... ... ,, | 1 | 1 | 6 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 12 | 6 |
| ,, Sulphide ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ,, | 5 | 5 | 0 |
| Strontium Hydrate, 98 % ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... per cwt. | 0 | 14 | 0 |
| ,, Cane ... ,, | 0 | 17 | 0 |
| Sulphocyanide Ammonium ... per lb. | 0 | 0 | 8 |
| ,, Barium ... ,, | 0 | 0 | 5½ |
| ,, Copper, 60% ... ,, | 0 | 0 | 8½ |
| Sulphur (Flowers) ... per ton | 9 | 0 | 0 |
| ,, (Roll Brimstone) ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) ... ,, | 2 | 2 | 6 |
| Tallow ... ,, | 26 | 0 | 0 |
| Tin (metal) ... ,, | 159 | 0 | 0 |
| ,, Crystals ... per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) ... per ton | 19 | 0 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

5, John Dalton-St., Manchester.

**SATURDAY, April 7, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.



## REMOVAL OF THE OFFICES OF THE "CHEMICAL TRADE JOURNAL."

The growing requirements of our Journal in respect to office accomodation have necessitated, thus early, a removal to more spacious premises. We have therefore to request our friends to note that the future address of the *Chemical Trade Journal* is

**No. 5,**

**JOHN DALTON STREET, MANCHESTER.**

Our new suite of Offices (which are situate at the Deansgate end of John Dalton Street) will, we anticipate, fully meet the requirements of the Journal for many years to come.

It is particularly requested that all communications for the Journal, whether editorial or otherwise, should be addressed **"DAVIS & CO.,"** and **not** to any individual member of the firm.

## PATENT LITIGATION.

MANY of our readers will, no doubt, be pleased to find that our lengthy report of the Spence *v.* Kurtz case has come to an end, and the space occupied with more readable matter. If we had realised the large amount of space the expert evidence would have occupied, we would scarcely have consented to have carried out our subscribers' wishes, but as we had so many letters urging us to print the expert evidence *in extenso*, we endeavoured to carry this out to the best of our ability. And now that the whole has been gone through, we may turn round and say, "Is the game worth the candle?" And this query may be made to apply in two ways, to ourselves and to the litigants also. As to ourselves we feel that the space devoted to the report has not been wasted, seeing that most of the evidence is exceedingly good reading to the chemist, and of much value to the manufacturer, showing as it does how the expert is liable to look at the question when he is paid to exploit this side or that.

If any manufacturer of chemicals will take the pains to carefully read over the evidence which we have reproduced from the shorthand notes, he will find some food for reflection, and the question, Is the game worth the candle? may apply to him also. We presume that every holder of Letters Patent for any specified process would well weigh the pecuniary side of the question ere he ventured into that expensive English luxury—a lawsuit—which the old riddle tells us is what nobody wishes to have, and yet nobody desires to lose; but in this case, through some anomaly of the patent law, a firm is forced into a lawsuit against their inclination, and, to make confusion more confused, neither of the litigants knew until the morning of the trial who was to be the plaintiff and who was to defend the action.

But leaving the legal aspect of the case out of consideration altogether as a matter beyond our ken, we say, Does it not point to the absurdity of taking scientific or trade matters into the law-courts at all? We think it does most undoubtedly; but it may happen that there are manufacturers who think otherwise, and when they read the result of this case in question, when they wend their way through the judgment of Mr. Justice Kekewich, may be tempted to exclaim "sarve him right!" Whether this exclamation applies to plaintiff or defendant we leave our readers to judge.

Any reader who has been tempted to wade through the mass of evidence, offered and paid for, on this occasion will no doubt have drawn a moral from the whole proceeding, and no doubt there is sufficient material for a code of morals to be drawn therefrom; whether such thoughts run in similar

lines to our own is a hard matter to decide, but we think there will be no difficulty in showing—first, the absolute necessity of thoroughly investigating a process, and getting legal opinion thereon before making any claims; secondly, the necessity for a revision of our Patent Laws; and thirdly, the absurdity of taking cases involving the interpretation of scientific facts into an ordinary court of law.

And there are several side issues bearing upon these great questions which may with advantage be discussed, such as the methods by which some of our laws are made and altered and the position of experts in courts of law. These things have not been duly considered, and those who do not know should be educated on such points.

Having the Kurtz *v.* Spence case before us as a text, and a tolerably long one too, it will serve as a peg whereon to hang several sermons in the hope that a perusal of them may lead to a much-desired reform, and so inspire confidence in those who require the aid of skill obtained from a deep study of natural science, that the witnesses employed are true exponents of Nature's laws, and not mere hirelings in the pay of those who can command the greatest amount of gold.

## THE VAPOURS OF HUELVA: SUPPRESSION OF OPEN AIR CALCINATION.

WITH great satisfaction we reproduce the important Royal Decree which was published in the *Gaceta* of the 1st inst. (March). Its great length compels us to postpone to another number such observations which a perusal of the same suggest themselves to us. Nevertheless, this does not prevent our tendering to Senor Albareda our approbation of the solution which has been arrived at with regard to the difficult question of the vapours.

*Senora:* For many years past in the Province of Huelva there has been "mourned" a grave question, viz., with regard to the development which the metallurgical industry has acquired, and to the devastating, insalubrious, and dangerous effects which the system of extraction adopted by the companies in exploring the minerals of that rich district have produced. From every point of view the question is a foreign one to the laws of mining. The special right which these create only refers to the exploration of the soil and the subsoil (surface and subsurface), for the extraction of the substances which the same classifies and determines. The operations to which these substances are afterwards subjected, with a view of transforming and utilising them, must be guided by common law or right, and must be subjected to the ordinary rules which stipulate the life of every industry, and which harmonise their existence with the general interests of the country, and especially with those of the public health and with those of the hygiene of the towns and fields. Thus it is explained that it is the Ministry of the Government, and on the other hand the counsellors responsible to your Majesty which propose the measures which have to be adopted in this case.

We will now treat of the progress and advancement of mining, or of conserving and widening its limits and prerogatives, the privileges which it unfolds and the exceptions which favour it; and the Government of your Majesty would not waver in one point in affirming and augmenting them, convinced as you are that that source of production, the cultivation of which attains in our country such a high degree of development and offers such brilliant and satisfactory results, is one of the foremost branches of the national wealth. But this is not the main aspect of the question which the Ministry of the Government to-day respectfully explains to your Majesty. The question between the metallurgical industries and the people of the Province of Huelva places in open warfare, and in a contest little less than irreconcilable, interests of another character.

On the one hand, the people claim directly through the authorised organ of your administration that the calcinations in the open air should cease, alleging that the enormous masses of sulphurous gas which the "teleras" emit into space cause the atmosphere to become unrespirable, injures the health of persons, and are the cause of the gravest diseases; they destroy plants and tree plantations, and rob the soil of the elements which are indispensable to vegetable life; moreover that the vitriolic drainings of the "ce tion" process alter the waters of the rivers, causin damage to the fishing industry, almost to causing appearance from that extensive zone if the conditi continued as they now exist, as well as agriculture the industries derived therefrom.

These evils, the transcendency and gravity of wh constantly increasing, inasmuch as each day the qua mineral calcined in the open air becomes greater. the State owned the Rio Tinto mines, prior to the ye when they disposed of them, the calcination only am to 220,000 tons, including the calcinations which are Tharsis y Silos, while at the present day, according worthy of credence, it exceeds 1,600,000 tons, sendi the atmosphere a volume of sulphurous gas amoun 87,700,000 cubic metres. Such an increase has com changed the limits of the problem. It is not reas neither can it be accommodated to the reality of the to judge the consequences of a reduced calcinati effects of which would scarcely be felt—and which without arrest have sustained grave complaints—whil which are now verified give out the immense masses o which vitiate the atmosphere and the extensive zone suffers therefrom. Thus, the complaints directed Ministry of the Government against this industrial and its consequences already arrive from localities far from the mining districts, and even from territories ing on the Province of Huelva which claim to be a prejudiced by the sulphurous and arsenical vapours.

The mining companies, the large population of w to whom they give work and sustenance, and even so porations of the Province interested in the increase commercial prosperity, an interest which on the othe is plausible for the purpose for which it is intended and prove that the works for benefiting the minerals a mines, the products of which they transform, have to this industry immense amounts of capital, an through their erection they have given railways to t vince of Huelva which it formerly stood in need of, fo centres of population of many thousands of inha converting localities which were formerly poor into which can now boast of abundance and wealth. The further, that the suppression of the open air calci owing to the sacrifice which would be the consequ necessitating the installation of apparatus indispens adopting a new system of treatment, and from the na the minerals which are extracted, would be equivalen disappearance or at least the decadence of that flou industry, producing as an effect of this result the r the impoverishment of that extensive district wh mines are situated.

These are the terms of this contention which have to a critical point, and which it becomes indispens solve. The local councils of the districts affected resolutions prohibiting, under their unquestionable ri continuation of open air calcinations, and the Co appealed against these resolutions to the Government Province and to the Ministry. The carrying out expedients, which of necessity were slow, contributed exciting the contrary aspirants and stimulating the wishes of those to whose respective interests the mat affected. The complaints from one side and the ot ceed one another and are constantly repeated, and it affirmed without any fear of running into error, that opinion demanded of the Government some steps would put an end to this state of things. It was u contribute towards the tranquility of the district re-established, without fear or hesitation of any kin ever, and where men's minds excited by being in dou what resolution would be arrived at with regard serious question required to be calmed down and p and in view of any definite solution arrived at putting to all the disputes and quarrels.

The solution is necessary; it is an indisputable the part of the Government to obtain it by dict remedy of a general character which would establ conditions under which the industries devoted to the of sulphurous minerals can carry on their labours prejudice to the public health, without diminish mineral sources of productive wealth. For a Gove there cannot be a more lofty consideration or a m dubitable duty than to place in safety and protec efficacious means, such respected and important in The minister subscribing this present believes he has s these requirements as far as possible, proposing, as

to your Worships the bold rules in the annexed project of the Royal Decree.

The Minister of the Government holds that it has become indispensable to prohibit the open air calcination of sulphurous minerals, and that it is necessary for the mining companies employing this system to adopt some other process, and to "sterilise" their smoke in such a manner as not to menace the public health and not to cause damage to agriculture.

And he believes this necessary after having examined authorised witnesses, who are unanimous in saying this industry can both exist and progress even when it is compelled to be modified and altered, adopting other processes—viz., the method applicable at the present day. Agriculture and its industries are becoming extinguished in the Province of Huelva in those parts which become affected by the noxious influences of the vapours; in the same manner the health of the persons of that extended region, as well as their lives becomes endangered, and everything tends to the belief that the mining industry will not be prejudiced by changing the present process of gaining minerals. It must therefore be elected to resolve the present conflict by this final peremptory order with the least risk and pain, the greater motive being that the reports of experts and of technical corporations, whose illustrious opinions the Government is bound to take into account, all coincide in affirming that the public health demands this solution in an imperative and insistent manner.

Moreover, there are considerations of a high moral order which counsel this. That portion of the country named is national territory, and the inhabitants who populate it possess the right, just the same as in all other parts of the country, that the conditions of life be preserved for them, and that this strip of territory which their ancestors have cultivated and owned for centuries, and to which their affections are united in the most intimate manner, and on which place their most loving and tender hopes are bound, should not now and for ever be converted into a sterile and unfruitful territory.

The Minister of the Government, therefore, does not vacillate in believing and declaring that his own duty counsels him to order the final prohibition of the calcinations. With regard to the manner in which it has to be disposed of, it could have been limited to respect the orders which, under use of the faculties recognised by law the council had adopted prohibiting that industrial process; however, it has been considered preferable to dictate a general measure which regulates this matter, to adopt partial resolutions, and that, moreover, in the accords of the local councils there have not been sufficiently taken into account the respect and consideration which the great interests compromised demanded, which is proved by the very short and narrow tract lately granted by those of Calanas and Alonso to the mining undertakings, that they should take in hand the transformation which was desired to be imposed upon them. The Minister also would propose to your Worships the strict compliance with and the application in the present instance of Article 74 of the Law of Mines, of Article 219 of the Law of Streams, or the Royal Decrees of 1848 and 1863, which order that the sulphurous and arsenical vapours be sterilised or condensed; however, all this would entail risks, inasmuch as the question at issue would not be totally solved.

By the same it is limited to invoke those precedents as testimony of the spirit which is revealed in our legislature, which is in accordance with that of all other civilised nations, without one single exception, inasmuch as not in one of them would it be permitted to carry on the calcination of iron-copper pyrites in the manner and to the extent which the industrial companies of Huelva now do.

In compiling the dispositions of this decree the Minister subscribing the present has taken into account that the changes imposed on the processes which the companies now employ will cause them considerable expense, and in order that these should not prejudice the development of the industry, they will be granted places where they can carry out the transformation with ease and even on a large scale. With the method adopted the industries will not suffer any important hindrance, and the injuries which the vapours now cause will not only not be increased, but they will go on diminishing in a progressive manner, and almost completely disappear in a relatively short space of time. When this terminal arrives, the territory of the Province of Huelva, in which these industrial establishments are situated, will become the theatre of a fresh and beneficial variation, while life will be possible and tranquil for everybody, producing a complete and harmonious development of the various elements of wealth, and the compenetration and equilibrium which should exist among all the forces of production.

It is to be hoped that the people and the workmen of the Province of Huelva will assist in the realisation of this patriotic work, for which the means are provided in the 4th and 5th Articles of the annexed project of decree, which at once stimulate the companies with efficacious advantages to coalesce in the most rapid manner with this transformation, inspecting them at once with a view of complying most scrupulously with the rules which are this day dictated, and which all have to obey.

Based upon these considerations, the minister who subscribes the present submits to the approval of your Majesty the annexed draft of the decree.

Madrid, 29th February, 1888.—Senora ——, A.L.R.P.

José Luis Albareda.

ROYAL DECREE.

In the name of my august son, the King D. Alfonso XIII. (Q.D.G.), and as Queen-Regent of the Kingdom, in virtue of the considerations which have been expounded to me by the Minister of the Government, and in accordance with the information furnished by the Royal Council of Health,

I proceed to decree as follows:—

*Article 1st.*—The calcinations in the open air of sulphurous minerals are prohibited.

*Article 2nd.*—The factories for benefiting minerals, which at the present time employ this system of open-air calcination, must, on the places and under the conditions which are prescribed by this Royal Decree, adopt another process, sterilising their vapours in such a manner as not to cause injury either to agriculture or the public health.

*Article 3rd.*—The said factories shall gradually reduce the number of tons of mineral which at the present day they calcine in the open air, according to the official statistics, in the following manner:—From the date of the 1st January, 1889, by one-fourth part; from the date of 1st January, 1890, by one-half part of what they are now calcining; from the date of the 1st January, 1891, sulphurous minerals are not permitted to be calcined by the process which the present decree prohibits.

*Article 4th.*—The Government will present to the Cortes a projected law conceding to the factories to which the foregoing articles refer the regulated and tributary advantages which it considers opportune as compensation for the damages which may ensue to them through the prohibition of the method which they at the present time employ in treating the iron-copper minerals.

*Article 5th.*—The Government will nominate a delegate of the corps of Mining Engineers, who, under the direction of the Governor of the Province of Huelva, shall inspect the metallurgical operations in order to cause compliance to be made by the companies with the dispositions of the present Royal Decree.

Dated in the Palace on the 29th day of February, 1888.

Maria Christina.

The Minister of the Government, José Luis Albareda.

—*Revista Minera.*

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[*Messrs. Koenigswärter and Ebell, of Linden, near Hanover, have sent us the following instructions for bleaching various goods with Peroxide of Hydrogen.*]

## BLEACHING SPONGES WITH HYDROGEN PEROXIDE.

**I. Preparation.**—The sponges are plunged into a mixture of 5 parts hydrochloric acid of 21° B. and 100 parts water, and allowed to remain therein for twelve to twenty-four hours. By this means the carbonate of lime as well as the oxide of iron are removed. In the event of a single treatment in this manner not sufficing, a repetition of the same should be made. Sponges which have red spots must be treated with a stronger acid mixture, consisting of 20 parts of hydrochloric acid and 100 parts water. Hereupon the sponges must be well squeezed out and washed for some time in clean water until the acid has been removed.

**II. Bleaching.**—Ten litres of our peroxide of hydrogen are mixed in a vessel made of wood, glass, or earthenware, with 225 grammes of spirits of ammonia of 20° B. The

sponges cleaned according to preparation I. are plunged into this bath and pressed together either by wood or glass rods. Temperature of the bath, 20° C. The duration of the process depends upon the quality of the sponges, averaging about forty-eight hours. During the process of bleaching, the sponges must be repeatedly squeezed and stirred. If continuous bleaching is carried on it is then desirable to adopt a series of three to four baths, and to utilise these systematically.

**III. Subsequent Treatment.**—The bleached sponges are pressed out and dried in a current of air, when practicable in sunlight.

## BLEACHING WOOL WITH HYDROGEN PEROXIDE.

**I. Preparation.**—By means of repeated washing in soap and water and diluted ammonia, the wool or the woollen fabric becomes freed from the dirt and grease attached thereto. The chemicals used in washing should be most carefully removed by means of soft water, free from lime.

**II. The Bleach Bath.**—In a wooden or earthen vessel (not a metal one), mix 10 litres of our hydrogen peroxide with 200 grammes of spirits of ammonia 20° B. (0·985 specific gravity); the cleaned wool should be plunged firmly and allowed to remain therein for the space of ten hours. During this time the bleach bath must be placed in a room heated to 20° Celsius.

After completion of the process, the bleached wool or textile is passed through a wringing machine, by which means of treatment the superfluous bleach bath becomes removed, after which the moderately moist material is dried in a current of air of 15° to 17° C. If continuous bleaching takes place, it then becomes desirable to arrange a series of bleach baths, which are so systematically utilised that the unbleached article is placed in the bath which has been utilised the longest, so that after a few hours, having passed through the wringing machine, it reaches the second, the better bath, continuing until the bleaching process has been completed in the strongest bleach bath.

**The Second Method.**—Previous treatment of the wool or the woollen fabric as mentioned before. The bleach bath is prepared from 10 litres of peroxide of hydrogen and 200 grammes of spirits of ammonia.

The textile is plunged into the fluid and completely saturated with it, then pressed out and dried in a current of air at a temperature of 15° to 20° Celsius, or even dried in the open in sunlight. This process must be frequently repeated.

**III. Subsequent Treatment of the Bleached Materials.**—The dried materials are again subjected to a process of washing, adding to the soap solution a blueing element, such as methyl-violet, afterwards drying under the conditions well known for woollen goods.

We urgently request that the bleaching process should be determined by periodical analytical testing or fixing of the hydrogen peroxide contents of the bleach baths, for which purpose we furnish special instructions.

## AIR POLLUTION BY MANUFACTORIES.

BY R. FORBES CARPENTER.*

NOW let me give you one or two instances of success. The first that I will detail to you is remarkable inasmuch as the quality of the fuel used is the most unfavourable possible for complete combustion to be effected. At the colliery of Mr. Herbert Fletcher, Little Lever, the chimney is extremely well situated to become a great nuisance to near dwellers and passers by, being not a lofty one and on the slope of a steep bank, the top being almost level with the canal, and there being house property on the flat top of the hill beyond the canal. Small coal from the pit, of the very smallest, dirtiest description, is used. When the boilers were hand fired you may imagine the nuisance to anyone passing along the canal bank, or to the houses near by on a level with the chimney top. Mr. Herbert Fletcher pluckily set to work, and was not satisfied until he had most completely cured the evil. I have frequently seen the chimney during the last four months, and have had to watch attentively, even when quite close, to see the waving currents of heated air, to see if the boilers were really working. Here there is ample boiler space, and mechanical feeding and stoking with very simple regulation of air supply, have completely effected the desired result. Mr. Herbert Fletcher has been so desirous to convince stokers and others engaged in firing boilers that the removal of the smoke nuisance is feasible, that he arranged for demonstrations on Sunday afternoons during October and November, so that the parts might be examined, the system explained, and the cause of success made clear. He does not claim any merit of special kind in the system of mechanical stoker adopted, but he has by experience acquired a clear idea of the elements of importance in the question of smoke prevention, and now he naturally wishes fellow manufacturers and air polluters each to study the problem for himself, having shown the way in which he has coped with difficulties greater than many of his neighbours have to contend against. In Mr. Herbert Fletcher's case there are, I believe, no sudden demands for steam, but when this is the case the boiler power should be sufficient for the greatest stress at any time, else success will not follow. How frequently it is the case in towns like Manchester ground space is valuable and has to be rigidly economised, the mill being surrounded on all sides by similar property, yet even here I believe if real pressure were applied to manufacturers, ingenuity would not be wanting in discovering sites for additional boilers. In the administration of the Alkali Acts since 1863, very many cases have arisen where the manufacturers have declared that compliance with the limitation laid down was impossible, but gradually means were found, and experience has shown that in the present even more stringent limits could be very generally complied with. In the case of future legislation as to smoke abatement the same principles apply as to escapes from alkali manufactories. A certain economy of fuel will probably be found to ensue in a great many cases, and will certainly ensue when insufficiency of boiler power and grate area is the cause of the emission of smoke.

The next case I propose to bring before your notice of successful treatment of the smoke problem is on a larger scale. Here it is not a single works that shows a marked difference from its neighbours, but a whole cluster of factories are remarkable for the absence of the usual concomitant of chimneys belching out volumes of black smoke. This spot is at Sowerby Bridge in Yorkshire, an important junction on the Lancashire and Yorkshire Railway. As in most of the valleys in these busy districts, factories are clustered along the river bank and on the neighbouring hill sides. When I first passed through the district six years ago, I came to the conclusion that trade must be very bad for so many mills to be shut down. In time I discovered that the mills were running, but a large proportion of the chimneys were nearly smokeless, or quite so, and further inquiry revealed the cause. Some twenty years or more ago several gentlemen in the neighbourhood, some of them manufacturers and some also magistrates, formed themselves into a Smoke Abatement Association, and engaged inspectors to watch the mill chimneys. Offenders were summoned before the magistrates and fined. Those manufacturers most active in the crusade had taken the beam out of their own eyes before complaining of the motes in their neighbours', and hence were able to point out a better way that could be followed by those really in earnest. This was unquestionably the right way to go to work, and a very different way from that adopted by an acquaintance of mine who is interested in the work of the Manchester and Salford Noxious Vapours Abatement Association, himself a manufacturer, who, when I asked him what means he himself used to prevent smoke at his own mills, replied to me that the mills were old, trade was decaying, and it would not pay him to put in any of the forms of mechanical stoker such as are successfully employed for this end! To return to Sowerby Bridge. After a few fines, and seeing the crusaders were in earnest, the manufacturers of Sowerby found it to their peace and interest to use the best practical form of mechanical stoker then known. Several have replaced the earlier by more modern forms, but the old Jukes furnace is still in operation most successfully at Sir Henry Edwards' mill and others. In the Jukes furnace the firebars consist of an endless revolving chain, the fuel being carried slowly forward and the clinkers are topped over at the bridge end, when the chain reverses to return underneath. The chain is rather expensive to keep in repair, and too much cold air is drawn in at the end of the bridge where the clinkers fall, else the combustion of the fuel is perfect and smokeless. Sir Henry Edwards carried his theory so far as to build no

* A Lecture delivered at Prestwich, by R. Forbes Carpenter, Esq., Government Inspector of Alkali Works.

special chimney for his mill; the corner of the building is walled off, and this is the shaft conveying away the products of combustion, the draught to burn the coal being provided by a fan forcing air into the fire. An extension of the mill being made, more boilers were put down in a separate building; here a very low chimney shaft was built; from this and from the corner of the mill you will at times see a bluish white semi-transparent vapour, and I have been solemnly assured by a gentleman who resides near that this is far more hurtful to trees and shrubs than black smoke!! More knowledge would have enabled the gentleman to see that he might be grateful for having the removal of one evil, even if the other evil, sulphurous acid vapour, were not touched. The association has been for some years defunct, and new mills, not under the same restrictions as the old, serve by their smoky chimneys only to bring into greater contrast the beneficent work of the association and what might be further effected were it still in existence. This, I think, is a good instance of what we may hope for in the future as to the removal of black smoke in manufacturing districts.

From the nature of the constitution of our local boards the enforcement of any provisions as to smoke prevention are very capricious and fitful in their working. Naturally, the manufacturing element is largely represented on the boards, and unless public attention is perpetually called to the question, it gives place to topics of more exciting interests, perhaps to personal altercations studiously recorded in the local newspapers at the end of the week! Some years ago the question arose in Radcliffe as to smoke abatement, and our old friend Dr. Hewitt, then chairman of the board, felt that to a certain extent his hands were tied, as the pot could not very well call the kettle black. I do not think that any very practical diminution of smoke ensued from the discussion. In the Metropolis Lord Palmerston's Smoke Act is administered by the Metropolitan police: this well-abused body, but independent authority, being charged with the enforcement of the law.

I think it is in this direction we must look for general amelioration of our condition. I trust that when the new scheme of County Government sees the light this session, that there may be provisions made for the due enforcement of powers that already exist, but are rusty from disuse.

Now let us again inquire whether, as in the case of the administration of the Alkali Act, human ingenuity applied to this problem may not result in the stoppage of waste and in national gain. Something has already been done in this direction, and experimenters are still busy in the field. As to results *obtained*, I may mention the case of coke-ovens, and the recovery of tar and ammonia therefrom, an industry which has taken great strides in the last six or eight years. Dr. Angus Smith estimated the national loss of ammonia and tar escaping with the black smoke from coke-ovens in Great Britain annually at two or three millions sterling. Success in this direction has been largely due to the efforts of Mr. Simon, an engineer in Manchester, who developed the Carvè's system introduced in France.

A further step in this direction, with more development, has been taken by Mr. Mond, of Brunner, Mond, and Co., of Northwich. Mr. Mond's work is only as yet in what he calls the experimental stage, but the experiment has been on the scale of burning 12 to 16 tons of coal in twenty-four hours; this coal being "slack" of various qualities from different localities, such as is used in their steam boilers, with the usual result of constantly smoky chimneys, for which the firm have frequently been fined by the Cheshire magistrates. Mr. Mond can by his new arrangements convert his slack into gaseous fuel, which he can burn smokelessly. His principle is the introduction of a large quantity of steam, or steam mixed with finely divided water, into the "producer," which is kept at a lower heat than usual (not above dull redness). A larger yield of ammonia is obtained, which is condensed before the gases pass to the boilers, where they are burned. The increase in yield of sulphate of ammonia made from this ammonia will pay not only for the somewhat greater consumption of gaseous fuel over ordinary slack for evaporating a given quantity of water, but, where fuel is cheap, will go far towards paying the whole cost of the latter, the gain being about seven shillings per ton of slack so treated, 66lb. sulphate being realised. Not only is the fuel converted into gas burned smokelessly, but a large proportion of the sulphurous acid is absorbed in the scrubbing apparatus employed to wash the ammonia out of the gases before combustion. This experiment and its development are being watched with interest.

There are two other directions in which we may look for improvement. It will be within the knowledge and experience of us all that frequently the most local annoyance to neighbouring houses is caused by the low chimney of a little factory, greater than that from a neighbouring tall chimney of a big mill. It is quite within the possibilities of the near future that gas engines, supplied possibly with gas from Wilson or Dowson producers, will gradually replace the little steam engines and boilers used to supply power for small industries. Not only will the evil of black smoke issuing at a low level be prevented, but the ever-attendant risk of boiler explosion be removed. It is notoriously the case that this risk is greater in small works, where less skilled attention is likely to be found.

Again, in Birmingham, a great centre of small industries, a system of supply of compressed air for working small engines has been established. I have more hopes of its future than of either the American systems of distribution of steam or hydraulic pressure from one centre. At these centres of produce of power, coal, of course, is burned for steam-raising; but it can, of course, as I have indicated, be burned smokelessly, and, if Mr. Mond's system be adopted, with less emission of sulphurous acid. Again, there seems a great probability of the early spread of the hot-air engine as a prime mover. Mr. Hargreaves has obtained results which are astonishing. The best results obtainable from the steam engine, even if theoretically perfect, would be a fraction over 1lb. coal for one-horse power per hour. The best results obtained show a consumption of 1½lb., so that the maximum efficiency of the steam engine is nearly attained. The gas engine has already attained to the highest possible efficiency of the steam engine, and is capable of still further improvement. Mr. Hargreaves, in his hot-air engine, has obtained 40-horse power per hour from the consumption of two gallons of gas-tar, costing 1d. per gallon; or, reducing to the same standard as in the former case, one-horse power per hour is developed from the combustion of 0·56lb. of liquid fuel, costing 1d. for 10lb., without requiring chimney-shaft, or boiler, or stoker, and though not without use of water, with less use of it than is required in the steam engine. No wonder, then, that engineers are watching the development of Mr. Hargreaves' engine with absorbing interest. Sir Frederick Bramwell's prophecy that in fifty years' time steam engines will only be found as curiosities in our museums seems likely to find fulfilment.

Before briefly considering the second of the heads into which I divided my subject, I should like to close the consideration of the injurious effects of smoke on vegetation by short reference to that coming under the head of air pollution from household fires. Now, firstly, at the time of the year that vegetation is most vigorous and entering on new life, our consumption of coal in our households is much diminished, and gradually in summer attains its minimum. That this exerts a material effect on the question is clear, if we consider a town largely without manufactures. London is the most conspicuous example, and it has been found possible to plant out of doors in the London parks during the summer dracœnas and other plants and shrubs of sub-tropical origin, where they flourish and give pleasure to the thousands frequenting these public resorts. During the winter the other side of the shield is turned to us, and the sufferers from London fogs are for a time loud in their condemnation of existing firegrates, and are apt to demand legislative protection from fogs by abolition of all grates and the substitution of gas fires for those in which coal is burned. Fogs are found to consist of particles of soot enclosed in little vesicles of acid watery vapour, coated with paraffin oils. All these objectionable products come from the imperfect combustion of coal. It must not be imagined that gas and coke fires are without their grave disadvantages. In this class of heater it is not uncommon for imperfect combustion to occur, resulting in the production of that most deadly gas, carbonic oxide. A case of suffocation occurred some years ago at Glossop that at first seemed most mysterious, but the explanation eventually was perfectly clear; a down draught from a neighbouring chimney had brought down gases largely charged with carbonic oxide into the room where two girls were sleeping, with the fatal result that I have mentioned. Sir Henry Roscoe was the first to indicate the true cause. I could detail others, but have said enough to show that, smokeless as this method of heating may be, it is accompanied by grave risk to health. Also, legislation here will be very difficult, especially as every Englishman's house is his castle.

This now brings me to the second head of my paper, as to

the question of deterioration to health from air pollution from manufactures. Taking the smoke evil first, the increase of bronchial suffering during a visitation of fog such as we have lately experienced is patent to everyone. Less patent, but still certain, is the general lowering of vitality from the lessened amount of sunshine that I previously told you prevailed in manufacturing districts. Men and women must suffer from this as well as trees and plants.

The late Chief Inspector of Alkali Works, Dr. Smith, endeavoured to ascertain from the medical officers of health of large centres of chemical industries, such as Widnes and St. Helens, what was the special effect of air pollution from these sources on vitality. The problem is beset with difficulties. Firstly, the workers in these large busy districts are men in the prime of life. Then, as soon as they can no longer work they are apt to leave the district. Comparison of statistics with those of other towns is difficult, and a careful sifting is necessary. Dr. Smith wrote with very great caution, and, while recording the results already obtained, felt the necessity of prolonged further observation. We see, then, that this is a subject on which those most competent to speak have not yet been able to sound a certain note. Dr. Smith pointed out that, even as to the innocent vapour of water, on a calm day, when there is no escape for the products of combustion, something had to be noted. "We learn to appreciate the importance of this element in making an artificial atmosphere, a climate peculiar to a manufacturing district, and a peculiar feature in the meteorology of inhabited places. It is under or in this covering of vapour that all the gases and emanations we object to rest. In a dry climate they disappear, by heavy rain they are washed away, and in a windy climate they are blown away." In heavy winter fogs or stagnant air Dr. Smith estimated the acidity to increase sixfold.

To come now to works dealing with offensive materials giving off odours which produce nausea in persons of delicate constitution or of special delicacy in this direction. We find that the powers possessed by Local Authorities under the Public Health Act of 1875 are not as clearly defined as could be wished. Besides the fact that certain classes of works are exempted or partially exempted from its action, there is a difficulty in putting the Act in motion because the Medical Officer of Health may entertain honest and conscientious doubt in giving a certificate as to whether an emanation is or is not injurious to health. Dr. Ballard, who was engaged during portions of four years in making inquiries as to noxious trades, makes some remarks on this difficulty. Dr. Ballard was charged by the Local Government Board with the inquiry and his reports are of very great value. Since they were made, by the extension of the Alkali Act, several of these classes of works have come under its operation and under inspection. Dr. Ballard summarises the difficulties he encountered under three principal heads. Firstly, the Medical Officers of Health and Sanitary Inspectors have not, as a rule, the technical knowledge to enable them to deal with the often very intricate and complex problems raised, as to how to prevent the escape of and to destroy the noxious vapours emitted. Secondly, the hesitation of Medical Officers of Health in pronouncing the emanations to be "injurious to health," when such emanations are only occasionally felt, and produce transient feelings of nausea; and thirdly, the somewhat numerous exemptions under the Act make procedure and the initiation of proceedings a difficult thing for the Sanitary Authority to undertake. To these I may add, fourthly, frequently the presence on the Local Boards of representatives of the industries causing the emanations. It is to be hoped that in course of time the Alkali Works Act will be extended into a Noxious Vapours Act, when Local Authorities will have the advantage of the aid of inspectors whose whole training and experience will enable them to deal with nuisances that arise, and suggest remedies and palliatives that would be beyond the probable reach and experience of the average Nuisance Inspector and Medical Officer of Health. A noxious vapour should be defined as one of which complaint is made, taking due precaution to sift out capricious and malevolent complaints. As an example of what can be done in this direction, I may instance the Corporation Works at Rochdale, dealing with the excreta, garbage, and ashes collected in the town; the pail system being in general use in Rochdale. In 1882 I commenced a study of the operations conducted there. Mr. G. E. Davis was then Inspector of the district under the Alkali Acts, and knowing his previous experience in these matters, the Corporation Committee were persuaded to erect a destructor furnace of sufficiently ample area to expose all the foul gases evolved in treating the excreta with acid and heat, to a red heat for eight seconds. Previously to 1884 there was much complaint; litigation was threatened and initiated by a councillor who owned property near the works. Houses lay empty, and the committee became anxious, as they had laid a large amount of money out in their works. They gladly accepted Mr. Davis' help, the plans he drew were carried out, and now the whole condition of the works is made as sweet as such a works can be. Houses near are not only tenanted, but new rows are being run up and tenanted as soon as built. The corporation had been fighting with their problem, groping in the dark for years to the great annoyance of the population, but the application of the knowledge of a skilled chemical engineer met the difficulties and solved them satisfactorily. The extension of the Alkali Act has proved so beneficial to the classes of works brought under its provisions since 1882, that I have full hopes that in the course of future years other classes will be gradually added. It seems curious that, for instance, in a tar works manufacturing sulphate of ammonia an inspector should have legal powers to prevent the escape of sulphuretted hydrogen into the air from the latter manufacture, while within a few yards of him the gas is being evolved from another process uncheckable by him as to legal powers of check; persuasion and advice being in such cases all the power that can be brought to bear. The stipulation, too, "that the best practical means be used" would in itself fix a progressive standard.

In closing this brief survey of the great and widespread features of air pollution, I am conscious I have only, as it were, lifted the fringe of the curtain, and enabled you to get a peep at the elements of doubt and of difficulty surrounding the problem of how to effect a cure.

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Note.—Those desiring to make closer study of the question would do well to purchase the lectures given under the auspices of the Manchester and Salford Noxious Vapours Abatement Association during the last two seasons. They are published by John Heywood, at the rate of one penny per lecture. The best work of reference on a larger scale is "The Official Report of the Smoke Abatement Committee, 1882," published by Smith, Elder, and Co., and may be consulted at the Public Library in Manchester.

## BEETROOT SUGAR REPORTS.

**France, March 28.**—The severe cold has given place to rainy and seasonable weather. The rapid melting of the snow with very heavy rains have caused the rivers to rise to a higher level. The soil is in a soft state, and cannot yet be easily worked. It is no exaggeration to estimate the delay of field work as a month, which will not probably be regained. Usually sowing of beetroots commences about the end of March, whilst this year it will not be before the latter half of April.

**Germany, March 23.**—Instead of spring weather there have been very heavy falls of snow, which have considerably interrupted communication, and, it is feared, when the thaw comes there may be inundations. It is not expected that the sowing of beetroots will become active before the middle of April, and it is doubtful that this delay can be overtaken. In Germany, as also in Austria, opinion is very much in favour of the establishment of a system to collect figures as exact as possible, so that the sugar industry may not be so much at the mercy of speculators in the statistics published by them for their own ends, but be able to ascertain what is the actual position of the article. This it is proposed to do by appointing responsible men over thirty or forty districts.

**Austria, March 21.**—The recent falls of snow have considerably delayed field work. Nothing is yet known as to the area to be sown with beetroots, but it is contemplated to establish some new manufactories. The consumption of sugar in the following countries is, according to Mr. Licht, per head of the population:—Germany, 18·64; Austria, 11·08; France, 22·83; Russia, 8·64; Holland, 19·94; Belgium, 18·32; Denmark, 19·05; Sweden and Norway, 17·42; Italy, 7·19; Roumania, 3·86; Spain, 7·40; Portugal, 9·00; England, 66·57; Bulgaria, 3·3; Greece, 10·0; Servia, 2·94; Turkey, 4·33; and Switzerland, 21·37. The total population of these countries is 357,700,000, and the average consumption per head is 17·85lb. per head. North America, with a population of 58,000,000, consumes 49·19lb. per head. Europe and America together, with a population of 415,700,000, consume an average of 22·20lb. per head.

# ENGLISH VALUES OF FOREIGN MONEY.

| COUNTRY. | GOLD COINS. Denomination. | Legal weight in grains. | Sterling value. | SILVER COINS. Denomination. | Legal weight in grains. | Equivalent weight of standard silver in troy ounces. | Intrinsic value with silver at per troy ounce. 42 | 43 | 44 | 45 | Gold to silver as 15·5 to 1. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | £ s. d. | | | | s. d. | s. d. | s. d. | s. d. | s. d. |
| *Austro-Hungary | Ducat | 53·85 | 0 9 4 | *Florin or Gulden* of 100 kreutzer | 190·5 | 0·386 | 1 4¼ | 1 4⅜ | 1 4⅝ | 1 5⅛ | 1 11½ |
| | 8-florin or gulden piece | 99·57 | 0 15 10½ | ¼-florin | 82·4 | 0·097 | 0 4 | 0 4 | 0 4⅛ | 0 4⅜ | 0 5⅝ |
| *Belgium | See footnote. | | | | | | | | | | |
| Brazil | 10 milreis | 138·35 | 1 2 5½ | 1 milreis of 1,000 reis | 196·8 | 0·406 | 1 5 | 1 5⅛ | 1 5⅜ | 1 6 | 2 0⅜ |
| Chili, Columbia, Uruguay | doubloon or 5-peso piece | 117·70 | 0 18 9 | 1 peso of 100 centavos | 385·8 | 0·782 | 2 8⅜ | 2 9⅛ | 2 10¼ | 2 11 | 3 11½ |
| China | | | | Tael of 10 mace or 100 candarin or 1,000 cash | 583·3 | 1·288 | 4 6¼ | 4 7⅛ | 4 8⅛ | 4 10 | 6 6¼ |
| *Denmark | 10-crown piece | 69·14 | 0 11 0½ | 1 *croun* of 100 ore | 115·7 | 0·209 | 0 8⅜ | 0 9 | 0 9¼ | 0 9½ | 1 0⅜ |
| Egypt | 100-piastre piece | 132·00 | 1 0 5 | 1 piastre of 40 paras | 19·3 | 0·039 | 0 1⅜ | 0 1⅜ | 0 1⅜ | 0 1⅜ | 0 2¼ |
| Finland | 10-markkaa piece | 49·78 | 0 7 11½ | 1 mark of 100 penni | 80·0 | 0·156 | 0 6½ | 0 6⅝ | 0 6⅝ | 0 7 | 0 9½ |
| *France | 10-franc piece | 49·78 | 0 7 11½ | 5-franc piece | 385·8 | 0·782 | 2 8⅜ | 2 9⅛ | 2 10¼ | 2 11 | 3 11½ |
| | | | | 1 *franc* of 100 centimes | 77·2 | 0·145 | 0 6 | 0 6¼ | 0 6⅜ | 0 6½ | 0 8⅜ |
| *German Empire | Crown of 10 reichsmarks | 61·45 | 0 9 9½ | 1 *reichsmark* of 100 pfennige | 85·7 | 0·174 | 0 7⅛ | 0 7⅜ | 0 7⅝ | 0 8 | 0 10½ |
| *Great Britain | Sovereign of 20 shillings | 123·27 | 1 0 0 | Crown of 5 shillings | 436·4 | 0·909 | 3 1⅝ | 3 2⅝ | 3 3½ | 3 4 | 4 7¼ |
| | | | | Shilling of 12 pence | 87·3 | 0·182 | 0 7⅛ | 0 7⅜ | 0 7⅝ | 0 8 | 0 11 |
| *Greece | See footnote. | | | | | | | | | | |
| *Holland and Java | Ducat | 53·92 | 0 9 4⅛ | Rixdaler of 2½ florins | 385·8 | 0·821 | 2 10½ | 2 11⅛ | 3 0 | 3 1 | 4 2 |
| | 10-florin piece | 103·71 | 0 16 6½ | *Florin* of 100 cents | 154·3 | 0·328 | 1 1⅝ | 1 2⅛ | 1 2⅝ | 1 3 | 1 8 |
| India | Mohur of 15 rupees | 180·00 | 1 9 2⅝ | Rupee of 16 annas, 64 pice, or 192 pies | 180·0 | 0·372 | 1 3⅛ | 1 4 | 1 4⅛ | 1 4⅜ | 1 10½ |
| *Italy | See footnote. | | | | | | | | | | |
| Japan | 10-yen piece | 257·21 | 2 0 11⅜ | 1 yen of 100 sen | 416·0 | 0·843 | 2 11½ | 3 0⅛ | 3 1⅛ | 3 2 | 4 3⅛ |
| Mexico | 10-peso piece | 261·12 | 2 0 5½ | 1 peso of 100 centavos | 417·8 | 0·849 | 2 11⅜ | 3 0⅛ | 3 1⅛ | 3 2⅛ | 4 3⅜ |
| *Netherlands | See Holland. | | | | | | | | | | |
| *Norway and Sweden | See footnote. | | | | | | | | | | |
| Ottoman Empire | Turkish pound of 100 piastres | 111·36 | 0 18 0⅜ | 1 piastre of 40 paras | 18·6 | 0·035 | 0 1½ | 0 1½ | 0 1½ | 0 1½ | 0 2 |
| Persia | Toman of 100 shahis | 58·03 | 0 9 5 | Banabat of 10 shahis | ..... | ..... | ... | ... | ... | ... | 0 10 |
| Peru and Venezuela | 10-sol piece | 248·91 | 1 19 7⅜ | Sol of 10 dineros or 100 cents | 385·8 | 0·782 | 2 8⅜ | 2 9⅛ | 2 10¼ | 2 11 | 3 11½ |
| *Portugal | Crown of 10 milreis | 273·70 | 2 4 4⅝ | *Teston* of 100 reis | 38·6 | 0·080 | 0 3¼ | 0 3⅜ | 0 3⅜ | 0 3½ | 0 4⅝ |
| Roumania | See footnote. | | | | | | | | | | |
| *Russia | 3-rouble piece | 60·60 | 0 9 10 | Rouble of 100 kopecks | 320·0 | 0·626 | 2 2¼ | 2 2⅝ | 2 3½ | 2 4¼ | 3 2 |
| Servia and Bulgaria | See footnote. | | | *Tchetvertak* or ¼ *rouble* | 80·0 | 0·156 | 0 6⅛ | 0 6⅜ | 0 6⅜ | 0 7 | 0 9⅛ |
| *Spain | Doubloon of 10 escudos | 129·43 | 1 0 7⅛ | Escudo (or ½ dollar) of 10 reals | 200·3 | 0·406 | 1 5 | 1 5⅛ | 1 5⅜ | 1 6 | 2 0⅜ |
| | 25-peseta piece | 124·46 | 0 19 10 | Peseta of 100 centimos | 77·2 | 0·145 | 0 6 | 0 6¼ | 0 6⅜ | 0 6½ | 0 8⅜ |
| *Switzerland | See footnote. | | | | | | | | | | |
| Tunis | 10-piastre piece | 30·09 | 0 4 9⅛ | Piastre | 46·7 | 0·095 | 0 4 | 0 4 | 0 4¼ | 0 4½ | 0 5⅝ |
| Turkey | See Ottoman Empire. | | | Trade dollar | 420·0 | 0·851 | 2 11⅜ | 3 0⅛ | 3 1⅛ | 3 2⅛ | 4 3⅜ |
| *United States | Eagle of 10 dollars | 258·0 | 2 1 1½ | *Dollar* of 100 cents | 412·5 | 0·836 | 2 11 | 2 11⅞ | 3 0⅜ | 3 1⅜ | 4 2⅜ |
| | | | | ½ dollar of 50 cents | 192·9 | 0·391 | 1 4⅛ | 1 4⅜ | 1 5⅛ | 1 5⅜ | 1 11⅜ |

France, Belgium, Italy, Greece. and Switzerland constitute what is known as the "Latin" Union, and their coins are alike in weight and fineness, occasionally differing, however, in name. The same system has been in part adopted by Spain, Servia, Bulgaria, Russia, Finland, and Roumania, but they have not joined the Union. Francs and centimes of France, Belgium, and Switzerland are respectively designated lire and centissimi in Italy; drachmai and lepta in Greece; dinars and paras in Servia; peseta and centimos in Spain; leys and banis in Roumania; levas and stotinkis in Bulgaria. Similarly the Scandinavian countries, Norway, Sweden, and Denmark, employ coins of the same weight and fineness, their names being also alike. The venezolano (of 10 decimos) of Venezuela and the sol (of 10 dineros) of Peru are alike interchangeable, as also are the peso of Chili, Columbia, and Uruguay. In all British colonies, English money of every denomination is current.

The exchange value of the money of these countries indicated by a * is determined by the rate of exchange for the day, and may be taken as approximately that given in the last column. The rate given in the daily papers generally represents the number of the standard coins (those printed in italics) that are equivalent to one sovereign. The Spanish rate is given in terms of the old dollar (= 2 escudos). The value of other silver coins is approximately determined by the market value of silver, and must therefore be sought in one of the columns headed "Intrinsic value with silver at per ounce." The exchange value of the rupees depends on the rate for "India Council Bills." In all "bimetallic" countries pure gold is taken as being worth 15½ times its weight of pure silver. This proportion corresponds to giving standard silver a constant value of 60¾d., as in the last column of the table.

## NATURAL GAS IN OHIO IN 1887.

BY EDWARD ORTON.

THE year 1887 has done something for the discovery and much more for the utilisation of natural gas in Ohio. The fields previously known have been extended and to some extent defined, and several new fields have been brought to light, and one of them of great importance. In southern Ohio, at a single point, a gas horizon, not before found productive in that portion of the state, has been discovered. In northern Ohio, on the lake shore, a slowly increasing use of the shale gas that is so easily available is to be reported.

Throughout the State at large a vast amount of exploration has gone forward, and, except in a few favoured localities, there are no returns whatever in money value for the large outlays that have been made in the search. Drilling has been especially active in the south-western corner of the state. In all the county towns of this region and in many villages besides, one or more deep wells have been sunk. At a few points small supplies of gas have been obtained from the Utica Shale, but so far as known no value has been found in the Trenton Limestone in any of the wells that have been drilled here.

### GEOLOGICAL HORIZONS.

The several strata from which gas is now obtained in Ohio are the following, named in descending order:—

1. The Berea Grit.
2. The Ohio Shales.
3. The Clinton Limestone.
4. The Utica Shale.
5. The Trenton Limestone.

Each of these sources of gas will be briefly described, as it is at present developed in the State.

**1. The Berea Grit.**—This famous stratum has been tested by the drill at many points in eastern Ohio during 1887, but there are no great additions to be reported to its production. The search has been especially persistent in Muskingum, Guernsey, Belmont, Harrison, and Jefferson counties. Considerable encouragement has been found in the behaviour of several of the wells drilled in the two counties at the head of this list, but no facts are yet made public that warrant us in believing that any large reservoirs have been tapped. The search for gas in this region is much more intelligent than ever before. All of the geological elements involved are carefully studied, and account is made of those that promise help. It is rather humiliating to confess that though more intelligent, the search is scarcely more successful than it has hitherto been.

In Washington county high-pressure gas from this stratum is believed to be available, but there are no towns near enough to the possible fields or rich enough to develop and utilise their stocks. In the Macksburg field the gas is disappearing with the oil.

The Neff wells still remain the largest sources of Berea Grit gas in Ohio. Four of them are found in a little cluster, picturesquely situated at the junction of the Kokosing and Mohican rivers, in the north-west corner of Coshocton county, and "far from the madding crowd's ignoble strife." Two of the wells were drilled in 1865 and two within the last ten years. Their total production at the present time is about 400,000 cubic feet of gas per day, at a temperature of 60° F. It is used in the manufacture of lampblack, an important interest which was originated here. The wells require frequent attention in the way of the removal of the salt water that follows the gas, the pump being employed at intervals of three or four days. The gas shows remarkable persistency as the dates above named will indicate, but these wells furnish no ground for believing that high-pressure gas in large volume will continue to flow indefinitely.

The little wells of East Liverpool are still maintained for the lighting of the town and for the supply of a few stoves, but they are in "the sere and yellow leaf," and their days will soon be numbered.

It is scarcely possible that the best gas production of the Berea Grit in eastern Ohio has yet been reached. Nothing in the way of gas that is comparable with the oil of the Macksburg field has been thus far attained. It is a ground of regret that so much money must be lost in making this exploration, but the prize is so great that the work will still go forward.

**2. The Ohio Shales.**—These widely-spread sources of "surface indications" and low-pressure gas are gradually coming to be counted for what they in reality are, viz., valuable repositories of easily-obtained and fairly-durable home supplies of the best of fuel. It is not in them to yield the high-pressure gas of the reservoir rocks. When this fact is fully understood and accepted, the shales will be studied and worked for themselves alone. They seldom cover anything better than themselves in the way of a supply of natural gas.

**3. The Clinton Limestone.**—The Clinton Limestone, in its outcrops in south-western Ohio, is a petroliferous rock on a small scale. Attention was called to this fact twenty years ago in the geological reports of this district, but the idea that it might become, under proper cover, a reservoir of oil or gas in paying quantities, seems never to have been entertained by any one. The first display of this new function was made at Fremont, in northern Ohio. The shallow gas wells of this town all derive their supply unmistakably from the Clinton Limestone. None of them exceed 20,000 feet per day in production, and therefore the new horizon has created no great excitement in that section of the State.

In Wood county a single well has shown the Clinton Limestones to be an oil rock, as well as a gas rock, the production reaching 30 barrels per day for several weeks, but here again from the fact that this well was the only one out of several hundred that found any such supply, the discovery has not seemed important.

The recent experience of Lancaster, however, has given a new value to the formation. Two years ago a company was organised here to drill to the Trenton Limestone. They have not yet struck the Trenton Limestone, but they have struck what is better, viz., high-pressure gas in the Clinton Limestone, 1,000 feet or more above the level of the Trenton. In so doing they have added another source of high-pressure gas to the Ohio scale. The discovery is discounted, however, in advance, for a large part of southern Ohio, from the fact that the Clinton Limestone has been passed already in very many wells without a hint of gas or oil in noteworthy quantity.

The first well at Lancaster yielded 73,000 feet of gas per day before it was shot. Its production was thought to be largely increased by the shot. Well No. 2 yields about 800,000 feet of gas per day from a 5⅝-inch pipe, and well No. 3 about 900,000 cubic feet from a 4¼-inch pipe. The gas is perfectly dry, and apparently freer from sulphur than Trenton Limestone gas. Its closed pressure is doubtless high, on account of the depth from which it comes. The discovery is one of great value to Lancaster.

The drilling of these Lancaster wells requires a large outlay. Salt water needs to be cased off at about 1,900 feet in the Niagara Shale or the upper beds of the Clinton. Well No. 2 is cased with 5⅝-inch pipe to a depth of 1,900 feet. This is the largest line of regular casing known in the State. The gas horizon is a little less than 2,000 feet deep. It is a highly crystalline limestone, included between two beds of red rock, the upper one being a deposit of the famous fossil ore of the Clinton formation.

Small flows of Clinton gas appear to have been struck at a depth of about 2,000 feet, and at Cleveland in the Deep Rolling well at 3,150 feet.

The Lancaster discovery will doubtless lead to more drilling in the country around the town, but a considerable number of the nearest towns have tested the new horizon already, as has been previously stated.

**4. The Utica Shale.**—It is from this formation that numerous small but still respectable flows of gas have been derived in deep wells throughout south-western and central Ohio during the last few months. In this group of wells the maximum production thus far obtained by any single well does not much exceed 100,000 cubic feet per day. The closed pressure has been found to be less than 100lb. in all cases noted.

The gas of Miamisburg, Middletown, Hamilton, Camden, Felicity, Huntsville, and numerous other towns, is derived from the Utica Shale. As to the persistency of the supply, there are not facts enough to furnish good ground of judgment at present, but the appearances do not as a rule betoken a long life to the wells.

This horizon appears to be the only one available to south-western Ohio for natural gas. It is not of a sort to arouse a great deal of enthusiasm. At best it is a domestic supply and not adapted to manufacturers' uses.

**5. The Trenton Limestone.**—In this closing section we come to what is in reality the only important source of natural gas in Ohio at the present time. By whatever standards it is judged the Trenton Limestone is accrediting itself as one of the most remarkable repositories of gas and oil that has ever been discovered. It is furnishing in Ohio and

Indiana the largest continuous gas fields of the country. Unlike the Pennsylvania fields, these western competitors are not confined to anticlinals or arches, but they stretch out like coal fields.

Four counties embrace the large production of Ohio at the present time, viz., Hancock, Wood, Anglaize, and Mercer. The two latter have been added to the list in 1887. The St. Mary's field, under which both of these can be included, constitutes a very large and promising territory. Its wells have not yet reached the proportions of the best wells of Findlay, it is true, nor is the rock pressure of the gas as great as in them, but they range in production from one to five million cubic feet per day and their pressure is ample to force the gas to Lima, Greenville, Sidney, Piqua, and other thriving towns of this part of the State, which have either introduced it already or are now making arrangements to do so. It is obvious that the developments going forward here are of very great present and prospective importance.

The Findlay field still continues to be a main centre of interest. As this town led in the discovery of the gas, so it has kept at the front in its utilisation. It has made a wonderful growth during the present year. Large amounts of capital have been brought in from abroad and a score or more of substantial manufacturing enterprises have been established here.

The supply of gas from its wells is ample for all present uses, and the rock pressure when last tested was maintained at the figures that have prevailed for the past two years, viz., 375 to 400 pounds per square inch. That the gas is in reality a stored product, however, begins to be apparent to all good observers of the field, and the town is at last entering on a line of action that should have been adopted from the first. A decent economy in the use of the gas is beginning to be insisted upon, and the vandal-like waste of the choicest fuel of the world is no longer to be tolerated.

It is not to the credit of the intelligence of the towns of Ohio and Indiana that have been fortunate enough to secure the new fuel that they have wasted it when found in such barbaric fashion. The Karg well alone (the largest well of Findlay) is responsible for a total loss of at least 1,500,000,000 cubic feet of the gas of the field. This volume would meet all the legitimate requirements of Findlay for domestic, manufacturing, and municipal purposes for several years.

The amount of gas wasted in the new fields in vain display during the last year it is mournful to contemplate. Much of this waste has been demanded by speculators who were engaged in working up "booms" for the several towns. In a number of these towns 500,000 to 1,000,000 feet have been misused in this way every day for months together.

Now that Findlay is entering upon a measure of economy in the use of the gas, the cry is raised that the supply is running low. I do not know of any facts that bear out this claim, but I am sure that if the town had adopted two years ago some similar measure, it would have been of immense advantage to it either in the near or more distant future. Having neglected this obvious duty so long, no better time for reformation can be found than the present.

The Findlay field proper has been extended 3½ miles to the south-east of the town by the bringing in of a very important well, viz., the Ballard well. To the eastward, also, in Marion township, prolific territory has been developed. From this subdivision of the field, gas is now being transported by a pipe line to Tiffin.

The largest development of the year, however, has been carried forward in Bloom township, Wood county, and in contiguous territory, for the supply of the two pipe lines that lead to Toledo and the lines that supply Fostoria and Fremont. A large number of valuable wells have been drilled here, and this section of the general field is second to none in importance. The gas is, for the most part, used by the pipe line companies with due care and economy. The village corporation of Fostoria, however, which has drilled wells and laid a pipe line of its own, is still "making night hideous" with the baleful glare of a line of stand-pipes that encircle the town. It must be added that the town is making excellent use of its newly-acquired advantages in the establishment of important manufactories.

Bowling Green is adding to its gas supply by the bringing in of much stronger wells, two or three miles to the southward. Several of these wells approach a production of 1,000,000 feet of gas per day, and some of them may exceed this figure. The town has been fortunate in securing several valuable manufacturing plants. In fact, it is making as substantial progress and reaping as substantial benefits as any town of the new gas fields, Findlay alone being excepted.

The wells of Carey have proved virtual or total failures, but drilling done several miles to the west of the town, during the year, has been more fortunate, affording a full supply for all present demands.

The wells of Oak Harbour continue to supply the town. A half dozen or more have now been drilled, and some failures have occurred, but the supply has been thus far equal to the demand.

Two towns that lie well outside of the Findlay field and the Findlay conditions remain to be mentioned, viz., Bryan and Tiffin. In both of these locations the Trenton Limestone lies far below the dead line of the main field, but minor relief appears to come into effect to save them from entire failure.

Bryan has now drilled four wells, at an expense of more than $25,000. For this outlay there is at the present time to be entered on the credit side 225,000, cubic feet of gas per day, derived from two wells, both of which have been torpedoed, and the best of which is apparently falling off in production quite rapidly.

If the search is continued, it is quite possible that high-pressure gas will be struck at last in quantity sufficient for the use of the town. The areas of relief are, however, likely to be small, and the duration of the supply will be correspondingly reduced.

Tiffin has kept up a persistent search for oil or gas, and at last is rewarded by a well of unusual capacity for one outside of the belt of main production. Its last well is estimated by a competent judge to be 1,250,000 cubic feet per day. The estimate is probably based on measurements.

The gas of Tiffin comes from a depth of 1,500 feet, and has therefore a high closed pressure. The first real success in this field was attained by Loomis and Nyman, in a well drilled at their machine works in the summer of 1887. The volume of the gas was small, being about 60,000 feet per day, but its closed or rock pressure was at least 50 per cent greater than that of the Findlay wells. A gauge that was graduated to 600 pounds showed this entire amount of pressure when the well was shut in, and the index still travelled on, reaching finally a point that was counted at least 650 pounds.

The most important addition of the year, to our knowledge, of the Trenton Limestone as a source of gas remains to be briefly stated. It is this:—The rock is largely productive only when its upper portions have been replaced by dolomite or magnesian limestone. This change has taken place in the Ohio and Indiana gas fields, and also to the north and north-west of these regions.

In Southern Ohio, however, there is not a trace of this replacement, and consequently the Trenton Limestone within this region is in no sense a reservoir of oil or gas. The constant failures of the attempts to find gas or oil in the new horizon in this, and in many other directions, are sufficiently explained by the facts here referred to.

From Quebec to the Rocky Mountains, the drill has been set into operation in order to reach the new gas rock of Ohio. The formation is easily enough reached in a thousand instances, but it proves disappointing when it is reached. This disappointment will be found to hinge upon the chemical composition of the rock. The normal composition of the limestone, the composition which prevails through nine-tenths or perhaps ninety-nine hundredths of its extent, forbids it to be a gas rock or oil rock in any important sense. It is, therefore, by no means enough that the geological formations of any district are the same in the scale as those of the Findlay field, to ensure an oil field or a gas field therein. It must also be added that the upper beds of the Trenton Limestone in the new district shall have suffered the dolomitic replacement that has taken place in the Findlay gas rock.

Nor is this condition enough. The limestone must not only be porous, but it must be disposed in the right relations to surrounding portions of the stratum to enable it to accumulate gas or oil. In other words, the porous rock must have a due relief. On this condition nature inexorably insists. The porous rock will be filled when found, but ninety-nine times in a hundred it will be filled with salt water. It is only in the fortunate exceptions that porosity and structure combine to make the Trenton Limestone a source of Findlay gas or Lima oil.—*American Manufacturer.*

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ADVERTISING.—First Youth: "What's the matter—got a day off?" Second Youth: "No; I've resigned." "What for?" "Nearly worked to death. The shop was always crammed full of customers, and it just kept me on the move all day. Couldn't stand it." "But what are you going to do now?" "I shall try to get a place in some shop that don't advertise."

# Correspondence.

## ANSWERS TO CORRESPONDENTS.

H. H.—By an oversight of the Editor your letter does not appear till next week.

G. C.—The quality you name is about the ordinary average quality in the market.

E. J. D.—No; it is not possible.

Chemist.—Yes, £1,500 per annum. We hope the ratepayers will get value for their money.

W. H.—1. It depends on how much chlorine you pass over in a given time per unit area of surface. 2. Iron chambers are used in some places, but are not quite a success. They are coated with pitch and tar.

J. M. G.—The first lecture will be published in No. 48, and then from week to week. We are afraid we cannot get the addresses of the New Companies, but anyone can get them from the Registrar on payment of the usual fee.

# Trade Notes.

Coal-Tar Abroad.—At the present time France produces about 60,000 tons coal-tar annually, of which about 35,000 to 40,000 tons fall upon Paris. The greater portion of this tar is not distilled, but used for various purposes, and even partly burnt underneath the gas retorts.—*Chemiker Zeitung.*

The Microscopical Society of Glasgow.—At the ordinary monthly meeting of this society, held in Anderson's College on Tuesday the 20th ult.,—Mr. Robert Turner, vice-president, in the chair—Dr. Charles Workman read an interesting paper on "Disease Germs." He first referred to the bacteria which are found in the pus of abscesses, wounds, etc., a large number of which being of the species micrococii and bacilli—some of them being capable of producing disease in the lower animals when introduced under the skin or into a vein, and others, it would appear, being entirely innocuous. Certain species cause special peculiarities in the pus formed, the bacillus *Pyogenes fœtidus* causing stinking pus, while *Bacterium aeruginosum* produces pus of a green colour. These bacteria produce the same odour and colour when grown by pure cultivation in beef, peptone, and gelatine. Referring then to the bacillus of tubercle, he called attention to the danger of infection from using as food the flesh or milk of diseased animals, believing it likely that pleuro-pneumonia, inflammation of the lungs, and foot-and-mouth disease could also be transmitted to man in the same way. In order to lessen the risk, he strongly recommended that householders should provide a special saucepan, kept clean for the purpose, in which all milk on being taken into the house should at once be boiled. Though this might not destroy all spores, it would certainly kill the bacilli and micrococii. All flesh should also be thoroughly cooked before being used, so that if it were diseased it would be less likely to do any harm. He added that a German, named Scheurlen, had lately written in the German medical papers that he had discovered a bacterium which was the cause of cancer. This was shown by Pfeiffer, in a paper on the subject which appeared in last week's *Deutsche Medicinische Wachenschrift*, to be an error, the bacterium in question being a saprophyte, non-pathogenic, and only found in cancers which have ulcerated. The lecture was illustrated by photographs, shown by the oxyhydrogen light, and by a large number of carefully mounted specimens of the organisms under the microscopes, for which he was awarded the thanks of the society.

The Smokeless Powder Company.—At the statutory meeting of the Smokeless Powder Company, held last week, the chairman said that the capital had been well subscribed, 65,000 ordinary shares had been allotted and 5,191 preference. The vendors held 10,000 shares of each kind. There had been great difficulty in selecting a site for an extensive factory, but now a preliminary contract had been entered into for a site about twenty-seven miles north of London. There were 126 acres, excellent roads, and abundant supply of water, and a railway station within 2¾ miles. They hoped to have their factory erected in October, and to commence work in November.

Fatality in a Chemical Works.—A young man named Martin Power, of 16, Appleton-street, died early on Saturday, the 24th ult., from the effects of injuries received on the previous day. The deceased was employed as a labourer at Hardshaw Brook Chemical Works. It was part of his duty to attend to a small engine, and it is supposed that he put a crowbar in the wheel to start it. The wheel by some means got in motion, and the crowbar attached to it caught the deceased across the abdomen with such violence as to knock him a distance of several yards. He was afterwards found in an unconscious state lying near a wall. Power was removed to the Cottage Hospital, where he was attended to by Dr. Masson up to the time of his death.

Dalton's Pension.—It is worth recalling at this juncture. Dalton, as all the world knows, was a Manchester schoolmaster, who lived most simply and frugally in order to save the means to buy apparatus, and, therefore, he had at his disposal apparatus only of a simple and inexpensive kind. But, with it, he became the discoverer of the atomic theory of chemistry, thereby placing the science on its true basis. That was in 1803; but it was not till thirty years after that he was granted a pension of £150 a year—not till long after he had won for himself a European reputation, and been made a corresponding member of the Institute of France, which is recognised as the greatest honour that can be conferred upon any man of science.

The "Corner" in Lead.—It has been doubted whether the speculators who wished to "corner" lead had been able to form a syndicate. A circular sent us, dated from Denver, Colorado, not only affirms that it has, but adds that though the operators "have not secured more than 8,000 or 10,000 tons," they already command the situation. We have a little Americanism in the boast that they "stand quite ready to absorb and salt away 20,000 tons," so that it must be assumed that lead, like copper, is to be cornered.

The Rotterdam Tin Market.—A correspondent says that the unexpected rise in the price of tin, especially as regards Billiton, led to the belief that the demand would fall off, or at least remain stationary; but such has not been the case, and some parcels of Billiton required for immediate use and all March delivery could not be obtained under 96fl. to 99fl. The large holders appear very intractable, as they expect to be able to obtain even higher prices. Futures are neglected, 83fl. being quoted for May and 78fl. to 79fl. for June. At the last auction 24,000 slabs of Banca were sold at an average price of 94⅜fl.; and 753 of Billiton at 94½fl. to 95fl.

The Failure in the St. Helens Chemical Trade.—An adjourned meeting of the creditors of Messrs. Lockwood and Leith, chemical manufacturers, St. Helens, was held at the office of the official receiver, Liverpool, on Monday, Mr. Gittins occupying the chair. There was a large attendance. The liabilities were stated to be £26,100, and the stock-in-trade, machinery, etc., were valued at £5,205, the total assets being set down at £6,107, showing a deficiency of £19,990. Mr. H. S. Oppenheim, on behalf of the debtors, offered a composition of 5s. in the pound, to be paid in cash in a month. The great majority of the meeting appeared willing to accept this offer, as it was stated that if the estate was allowed to go into the Bankruptcy Court there would be several lawsuits to fight, and in the end there would be nothing for the creditors. The proposition was opposed by a firm who were creditors for £900, and it was mentioned that some gentleman was ready to offer 7s. in the pound for the plant and business, but on further inquiry it was found that the gentleman in question was not prepared to offer more than £7,000 for the works. The meeting then agreed, with one or two exceptions, to accept the offer made on behalf of the debtors, believing that the works would be continued to be carried on as before.

Employers' Liability Act.—There are three separate and independent Bills with respect to employers and workmen. The Employers' Liability Act (1880) Amendment, No. 1, introduced by Mr. Byrne, is fixed for second reading on Wednesday, June 27th; the Employers' Liability Act (1880) Amendment, No. 2, in charge of Mr. Burt, stands for second reading on Wednesday, May 2nd; and the Employers' Liability for Injuries to Workmen Act, No. 3, laid before the House by Mr. Secretary Matthews, is a Government measure, and likely to reach the committee stage some time after Easter. The private Bills will be withdrawn if the provisions of the Home Secretary's Bill should prove satisfactory, or Messrs. Byrne and Burt are at liberty to move amendments in committee. The Bill of 1888 has nothing startling or new in it. All its amendments have been fully discussed in the press, at public meetings, at associations of workmen, or by the Royal Commission.

Another Ship Canal.—There is reason to believe that during the coming spring the initial step will be taken to ascertain the possibility of constructing a ship canal, or one for vessels of burthen for about 600 tons, from Sheffield to the Trent.

The Exportation of Saltpetre from Iquique.—An Austrian expert says that the exportation of saltpetre from Iquique to Europe amounted in 1887 to 619,000 tons, and to the United States to 75,110 tons, altogether to 694,110 tons, against 431,500 tons in 1886. This great increase in the exportation during the year 1887 is principally to be attributed to the political state of the European continent, since merchants and beetroot growers were anxious to increase their supply. The increased exportation to the Mediterranean ports indicates the development of husbandry in those districts. The demand from California has increased threefold, which leads to the supposition that the fertility of the ground in that country has been overrated or that it has been overtasked.

The Alkali Inspector for St. Helens.—At the last meeting of the St. Helens Town Council the Deputy Town Clerk read the following letter:—

"Local Government Board, Whitehall, Mar. 28, 1888.

Sir,—I am directed by the Local Government Board to acknowledge the receipt of your letter relative to the removal from St. Helens to Chester, of Mr. Ballard, one of the Board's inspectors, appointed under the Alkali, etc., Works Regulation Act, 1881, and requesting that the Board will receive a deputation from the Town Council of the borough of St. Helens, in order that they may point out the importance of the inspector residing there. The Board having had under their consideration the question of the inspector's place of residence having given their consent to his residing at Chester, which is more conveniently situated than St. Helens for the inspection of the works within his district, and will admit of his duties being discharged at less cost in respect of locomotion. The Board may add that it is but little more than an hour's railway journey between Chester and St. Helens. The Board, under the circumstances, do not consider that there would be any advantage in their receiving a deputation.—I am, sir, yours, etc.,

Edmund H. Wodehouse, Assist. Sec."

The chairman: I am not aware what other steps we can take to put more pressure on the department. They declined to receive a deputation. They have made up their minds that the inspector shall reside at Chester, and we can do no more.

The Popularity of the Swiss Universities.—The tables just published by the Swiss Federal Bureau shows no decrease in the extraordinary recourse of young foreign students to the Swiss universities. These universities are four in number—Basel, Zurich, Berne, and Geneva. About 500 of the matriculated students are foreigners. There are 53 foreigners at Basel, 149 at Zurich, 103 at Berne, and 187 at Geneva. The foreigners are divided as follows among the faculties:—212 are studying medicine, 197 philosophy, 43 theology, and 40 jurisprudence. The matriculated students, Swiss and foreign together, give a preponderance to the faculty of medicine, which counts 749 adherents; philosophy is studed by 515, law by 301, and theology by 219. The non-matriculated students, or "hearers" at the four universities are about 400 in number, nearly half of these, 183, attending lectures at Geneva. At the University of Zurich there are now 60 female students, 40 of whom attend the medical faculty. A club of these young ladies, "Verein von Studentinnen," advertises in the *Zuricher Tagblatt* this week for a place in which to hold its social meetings.

What the Chinese Wear.—A foreign consul says that blue is the favourite colour for the clothing of the Chinese. The whole outfit for a farmer or labouring man need not exceed a pound a year. Cotton is grown all over the southern portion of China, and is manufactured into coarse cloth. Great Britain also exports a common cotton cloth which serves the same purpose. These cotton goods are all dyed with native indigo before being made into clothing. The manufacture of the cloth is done mostly in the family, and with the old-fashioned loom. The indigo plant is cultivated as a part of the crop of every farmer in the province. What is not required at home is put on the market for sale and exportation. Those who go into the manufacture extensively have a large brick-lined tank built in the ground six or eight feet in depth, and of a diameter of 10 feet or 15 feet, with a capacity of many hundred gallons. The plants are placed in these receptacles and covered with fresh, clear water, where they are allowed to steep for several days till the indican, a peculiar substance contained in the juices of the plant, is decomposed by fermentation. This process is aided by the application of a little slacked lime and frequent stirring, when the indigo is precipitated in the form of a dark blue sediment, which when dried forms the indigo of commerce. It could be profitably grown and manufactured in this country. The quality of the indigo is indicated by its colour; the richer and darker the blue the more it is esteemed and the higher is the price it fetches in the market.

Strong Drink.—A beerhouse-keeper, named James Bardsley, 52 years of age, who carried on business in Manchester-road, Denton, died on Thursday, the 29th ult., from the effects of drinking vitriol. It is stated that Bardsley had been drinking heavily of late. On Thursday morning he came down stairs about nine o'clock, and at once went out of the back door. As he was a long time away his wife went to look for him. She met him near the door, and, seeing that he looked strange, asked him what was the matter. He, however, made no reply, but walked into the house. Mrs. Bardsley at once sent for Dr. Bardsley, and on the arrival of that gentleman the deceased admitted to him that he had drunk a quantity of vitriol. Antidotes were applied, but without effect, and Bardsley died about one o'clock on the same day.

A New Company.—The *Swansea Journal* says:—It is with much pleasure that we are able to convey to our readers the welcome news that Swansea is to receive a new and important addition to its metallurgical industries. Various rumours have been afloat for some time that the old steelworks, recently vacated by the Landore Siemens Steel Company for their new and more commodious works, had been taken by a new company. A considerable sum has been spent in laying out the works, and it is understood that the manufacture is to be carried on on a large scale.

## MASON COLLEGE.

THE Council have just issued their report for the year 1887. It contains statistical tables showing the attendance of students in the day and evening classes, with the corresponding figures for the two previous sessions. The council have pleasure in again recording an increase in the number of individual students, there having been 377 in the day classes, and 371 in the evening classes, as compared with 360 and 205 respectively. The unusually large increase in the number of the evening students was mainly accounted for by the attendance at the lectures on "Wrought Iron," delivered by the lecturer on metallurgy (Mr. Thomas Turner). The following analysis of the entries of students for the past session is interesting, as showing the large proportion who are engaged in systematic study:—Preparing for University examinations, 77; medical students, 73; technical students (including 38 students in engineering), 64; occasional students, 163; total, 377. These are classed as follows:—Students attending classes in one department, 221; students attending classes in two departments, 50; students attending classes in three or more departments, 106; 226 of the students were males and 151 females. Professor Haycraft resigned the chair of physiology in March last, having been selected to take charge of the Physiological Department in the University of Edinburgh during the absence of Professor William Rutherford, M.D., F.R.S. The council have elected Mr. F. J. Allen, M.A., M.B. (Cantab.), to fill the vacancy. Mr. James Hamilton having been elected to a position in the Glasgow and West of Scotland Technical College, Mr. Ernest F. W. Wilkinson was appointed demonstrator and workshop instructor in the engineering department. Mr. T. J. Baker, B.Sc., has been appointed honorary assistant demonstrator in the chemical department; Mr. J. E. H. Blake, B.A., B.Sc., honorary demonstrator in the departments of zoology and botany; and Mr. Walcot Gibson honorary demonstrator in the department of geology. Mr. E. F. J. Love, M.A. (Cantab.), demonstrator in physics, has been appointed assistant lecturer and demonstrator in physical science in the University of Melbourne. In May last Mr. Samuel Allport resigned his appointment as librarian and curator of the geological musuem. His resignation, caused by long-continued ill-health, was accepted with very deep regret. The council have appointed as librarian of the college Mr. W. H. Cope, who since 1881 has performed the duties of sub-librarian. In accordance with the conditions upon which the members of the teaching staff are appointed, the council have taken into consideration the propriety of renewing the engagements of those whose terms of three years have expired during the past year, and Professors Heath, Hillhouse, Lapworth, Smith, Arber, Loreille, and Dammann, have been appointed for a further period of three years. The free popular Monday evening lectures to artisans have been continued by the professors and demon

strators during the past winter. Each lecture has been repeated on the following Monday evening, the average attendance being about 200. The lectures appear to be greatly appreciated. The balance-sheet of income and expenditure accounts for the financial year which ended on the 30th September, 1887, show that the gross expenditure was £8,592. 18s. 4d., and the income £7,252. 13s. 9d., showing a deficiency of £1,340. 4s. 7d. This is £306. 5s. 4d. less than the deficiency in the previous year, there having been a substantial increase in the income from students' fees and from the Additional Endowment Fund. The annually recurring deficiences have hitherto been met by a fund which accumulated during the building of the college (1875-1880), and amounted to nearly £15,000. This sum is now practically exhausted, and the council have therefore made arrangements for an appeal to the public of Birmingham and the midland district in aid of the funds of the college, with a view to its efficiency being maintained, its work developed, and its future operations conducted without incurring debt. They desire to record their grateful acknowledgments to "a Birmingham manufacturer" for his munificent donation of £5,000, making the total amount presented by him to the college £5,750. The council have lent assistance to the movement for obtaining State aid to local colleges in England, and earnestly hope that this attempt to obtain permanent Government aid may ultimately prove successful. During the past year special permission has been granted to twenty-two gentlemen to use the library for the purpose of study and reference. The following statement shows the additions which have been made since the last report :—Total number of volumes in the library on the 23rd February, 1887, 17,954; presented during the year, 313; purchased, 263; total number of volumes now in the library, 18,530. The total number of specimens in the museum on 23rd February, 1887, was 19,148; and there were 30 presented during the year. Appended to the report is a list of exhibitions and scholarships, and passes in the University examinations. In the University of London B.Sc. examinations five students passed with honours; in the intermediate science examinations three passed in honours and three in the first division; in the intermediate examination in medicine one passed in the first division, and four in the second; in the preliminary scientific (M.B.) examination, 1877, three passed in honours and three in the first division; in the intermediate arts examination, two students passed in honours and three in the first division. In the matriculation examination of June, 1887, three students passed in honours, seven in the first division, and one in the second; while in the January, 1888, matriculation examination, two passed in honours and three in the first division. At the University of Cambridge, two students obtained a place in the second class in natural science tripos. It appears from the accounts that of the year's income of the college, £3,916. 15s. was derived from Sir Josiah Mason's endowment, and £2,987. 19s. 3d. from students' fees. The stipends and shares of fees of the teaching staff amounted to £4,923. 14s. 7d., and the expenses of the various departments amounted to £552. 19s. 11d., in addition to £179. 18s. 2d. for apparatus. The general management charges were £2,222. 18s. 10d. Appended to the report of the council is one by Professor Bridge (chairman), of the Academic Board, who refers with satisfaction to the increase in the number of systematic students, and to their ability and industry.

## TECHNICAL EDUCATION AND THE HANDICRAFTSMAN.

SOME efficient and generally recognised system of technical education is admittedly a great need in this country, and just now a number of our most prominent men in art, science, commerce, and politics are engaged in working out a scheme to this end. This is right. An ignorant workman not only does no good, but often manages to do a great deal of harm. Therefore every workman should possess, in addition to his ordinary "schooling," some sound theoretical knowledge of his trade, whatever it may be. And that it is the duty of the State to see that this knowledge is duly bestowed upon him is equally a matter about which there need be no argument. Perhaps, observes the *British Architect*, the question would have been dealt with in a less determined fashion had it not been for the constant cry that England was being beaten out of the field in regard to many of her stable industries by her continental neighbours, both as regards price and quality. It is admitted that the continental workmen do more labour for less money than those in this country. Whether the English artisan will want less wages when he is better educated remains to be seen. But we confess we do not quite see in what way the higher education of the working man is going to cheapen production. The trades' unions will probably have something to say about that. But what we are most concerned about in regard to this question is as to the after results in regard to the quality of the work. So far, the whole of the arguments in favour of the scheme seem to have been based solely upon commercial considerations, and the one chief contention is that the future prosperity of the nation depends upon our ability to supply our customers with cheaper and better products than they can obtain elsewhere. It is a perfectly legitimate competition which seeks to place English manufacturers ahead of those of other nations in respect of quality, but whether we may be able to do this and, at the same time, compete successfully in regard to price, time alone can prove. There is, however, such a strong spirit of commercialism underlying the whole scheme that it may not unreasonably be surmised that the question of improving our chances of competition will be the ruling consideration in the working out as well as in the formulation of our technical education system. Said an architect to a joiner one day, showing him a casement that had lasted centuries, "You can't make casements like that nowadays." "Oh, yes, I could," replied the joiner, "but if I did I should be sent about my business, for the time and labour I should have to give to the work would simply earn me the character of a slow workman. Time is money now, and all our work has to be done as quickly as possible." To get the work done quickly is one of the first objects of the competitive system. Is our technical education scheme going to redeem this objectionable feature? Will the superior knowledge of the advanced workman alter in any way the economic conditions which at present govern production? Workmen will be better taught how to do their work, but unless they can be induced to use their knowledge with conscientious labour and pains, the higher education will fall short of its legitimate purpose. The fault of the art-workman of to-day is, not only that he has but little knowledge of art as applied to his craft, but that he has practically no real sympathy with his work beyond making it a means of material prosperity. Doing work well for the work's sake is well-nigh an exploded idea in regard to the handicrafts, and if manufacturers cannot afford to let their workmen put their very best into their work, how will our technical education system help us in regard to the economic problem? Artistic handicraft to be truly right in the spirit and finish of its execution demands higher qualifications than are contained in a Technical Instruction Bill. It is not mere manual dexterity, nor is it altogether theoretical knowledge, which makes a man an artistic workman; the foundation for all other qualifications is a conscientious regard for the work itself, so that it be produced with all honesty as well as skill. And though we may at least hope to increase men's appreciation of what is good and right in their work by giving them a more intelligent understanding of it, yet it is well we should remember that in no profession or trade is this conscientious regard the outcome merely of higher education or of trades' unionism. *The Globe.*

## DOES THE GIVING OF MEDALS PROMOTE SCIENCE?

AT the annual meeting of the Royal Astronomical Society, it was stated that there are now 595 Fellows of the Society and 48 Associates. Seven minor planets were discovered last year, and six comets. A discussion then took place on the subject of the granting of medals by scientific societies.

Mr. Ranyard proposed the repeal of the rule which provides for the award medal by the society. He said: I am not advocating any new idea. Professor De Morgan, whose name will always be held in honour here, expressed himself more strongly against medal giving than I have. In a remarkable introductory address which Professor De Morgan delivered at the University College in 1848 he went so far as to say that he would not even give medals and prizes to boys. He considered "the striving one against another for the highest place among boys or young men to be among the crudities of an imperfect system, as ineffectual in gaining the end of either *making* the best scholar or *showing* the best scholar, as its moral tendency is bad." He had had great

experience in teaching, and he points out that "with such young men as those who struggle to be highest, and who suffer in the struggle, no stimulus is needed beyond their pleasure in learning." It must be acknowledged that if the moral tendency of prize-giving is bad when the prizes are awarded by superiors, it will be worse when the prizes are given by co-workers, who are more or less dependent on those they reward, for co-workers, even if they do not look to get a medal themselves on another occasion, are dependent on one another in many little ways besides the publishing of their papers. As to medals being a stimulus to work, I think that is was admitted by the meeting last year that the work that should be rewarded is never done for the purpose of getting a medal. De Morgan did not think much of a teacher who could not stimulate his pupils to work without prizes to bribe them. He believed their interest might be stirred up in simpler and more natural ways. Amongst men no artificial stimulus is needed; success in the work is quite sufficient reward of itself. De Morgan's address was printed, and produced a deal of comment at the time. In De Morgan's Memoir it is stated that Sir John Herschel was greatly pleased with it, and that Professor Baden-Powell and Dr. Whewell wrote expressing their strong approval. Amongst other authorities against the system of medal-giving, I may quote Herbert Spencer and M. de Candolle. The latter says a great deal against relying on decorations or outside patronage as tending to promote the advance of science. De Morgan all his life long held to his principle, and refused to be elected to the Royal Society, because election to it was considered a distinction.

Mr. Common: Then would you abolish the Royal Society also?

Mr. Ranyard: That raises a more general question; I wish to keep to the question referred to in my motion. But I may mention that De Morgan would have abolished the practice of electing only fifteen Fellows annually to the Royal Society. In the preface to his *Budget of Paradoxes*, he points out that it would have been well worth while for a book-loving man like himself to have paid the few guineas which election to the Royal Society involves for the sake of the use of the Royal Society's Library, and the power of borrowing its books; but that he felt that election to the Royal Society was considered as a sort of distinction, and he preferred to be without it. He considered that a scientific society should be a sort of publishing club, and a place of meeting for co-workers, where by mixing with one another they would be stimulated to fresh thought. Everything should be avoided in such societies that promotes jealousy. This is a principle which is universally conceded in private life; and why should it be set aside as a rule which need not be followed by a society of individuals, whose joint action is always a little inferior to the action of the individuals composing the society? Commiftees are always less bold in adopting new ideas. They are less generous and also less honest, for no individual responsibility attaches to their action. We have only to look to history to see how bad the judgment of co-workers has been in selecting the right individuals to reward as those who are advancing science. Let anyone take the list of the Copley medallists selected by the Royal Society during the period covering the remarkable discoveries of Bradley. It was not the discovery of the aberration of light that was rewarded, or the discovery of Nutation, but little paltry investigations by men who are now forgotten, though no doubt they had their place in the social circles of the time. The fathers of photography never received the medal, and in our society Bunsen and Kirchoff have never received our medal, nor have the workers who built up the new science of meteoric astronomy. It cannot, therefore, be said that medals are useful as leading the way in science.

The motion was seconded by the Rev. Thomas Harley.

Captain Noble moved as an amendment that the rule be so altered as to preclude any Fellow of the Society actually holding office, or sitting on the Council at the time when such award is made, from receiving a medal.

A long discussion followed, and on a division there was found to be an equal number for and against the motion. The President (Mr. Glaisher) gave his casting vote against Captain Noble's motion.

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An Owner Wanted.—Three cases, containing three iron drums of surgical collodion, have been picked up thirty miles east from Scarborough, and delivered into the custody of the receiver of wreckage. The drums are painted red, and marked "C. G. and Co.," with a number.

## THE SAFETY LAMP COMPETITION.

MANY will learn with regret that the projected international competition for prizes for the safest lamp burning paraffin oil is likely to fall through. As originally planned, the first consideration was to be absolute safety, and the second that the lamp should burn, if possible, heavy mineral oil. The Imperial Russian Technical Society has now altered the conditions, and intends giving the prizes of 2,500 and 1,000 roubles respectively, only to lamps burning heavy oil, whether they are safe or not. It is sometimes thought that the heavier the oil, *i.e.* the less inflammable spirit there is in it, the safer it is to burn; but the principle is carried too far when people assume that a very heavy oil will make a lamp safe that is dangerous when ordinary oil is used. On the contrary, Sir Frederick Abel has pointed out that heavy oils mays be more dangerous than those of a lighter character. This, however, is not a consideration that seems to have weighed with the Imperial Technical Society, which has made the alteration mainly with the view to promote the production of lamps calculated to burn the heavy oils now wasted at Baku. It is a great pity that it did not express its intentions earlier, as it would have prevented thereby a deal of disappointment on the part of those manufacturers who forwarded safety lamps to the St. Petersburg Petroleum Exhibition. The only counterbalance is that an impulse has been given to the movement in favour of safety lamps started by Mr. Marvin's "Moloch of Paraffin," and that the display has shown very clearly Birmingham is becoming alive to the necessity of improving her lamps, not only in regard to safety, but also with respect to illuminating power. It seems that the lamps we have been using so long in England are regarded on the continent as quite out of date; foreigners universally displaying a preference for the circular wicks that give twice the light with a greater economy of power. However, as regards safety, Birmingham, in the opinion of Russian experts, has come off first, the newly-invented "Artisan" lamp being looked upon as one that, but for the alteration of the competition, would have certainly carried off the prize of 2,5000 roubles for the best safety lamp for the masses.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

There is no change for the better in the general market, and makers will be forced to a serious restriction of production unless there is a reawakening of demand all the sooner. The spring holiday has interfered with consumption partly, but its share of the hindrance lies on the surface only. That certain branches of the Scotch chemical industry are still in no desperate straits, notwithstanding the prevailing dulness, is attested by the handsome dividend announcement of the Nobel's Explosives Company and the first annual report of the Paraffin Oil-Gas Company, with also a very fair reserve for division. Sulphate of ammonia has at least held what it had a week ago, and possibly added a fraction. Buyers at £11. 15s. are easily obtainable, while a few sellers talk of £12. A fair mean value this forenoon is £11. 17s. 6d. Paraffin oil and other cognate products still lean to the easy side. Prospective changes in the French import tariffs have created a temporary call for Scotch lubricating oil, but the article is plentiful, and values, despite the spurt, are less firm. General prices current are:—Soda crystals, 40s. net Tyne; alum in lumps £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid £42 net Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76° £8. 5s., 70/72° £6. 15s., 60/62° £5. 15s., and cream, 60/62° £5. 15s., less 2½ % Liverpool; bicarbonate of soda, 5cwt. casks, £5. 15s., and 1cwt. casks, £6 net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 20s. 6d., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 12s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 % and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 10½d.; chlorate of potash, 5⅜d., less 5 % any port; sulphate of ammonia, £11. 17s. 6d. f.o.b. Leith; sulphate of copper, £22; paraffin scale, hard, 2 1/16d., soft, 2d.; paraffin wax, 120°, semi-refined, 2 11/16d.; paraffin spirit, 5d.; burning oil, 5⅜d. to 6d.; lubricating oil, 885°, £6. 5s. to £6. 15s., and 890/95°, £7. 10s. to £8. Clyde imports have included 9,530 tons iron ore, 150 tons sulphur ore, 1,750 tons nickel ore, and 1,400 barrels rosin. Greenock, 27,278 bags and 5,618 baskets sugar.

## THE LIVERPOOL MINERAL MARKET.

The market has continued steady during the week, and there is no material alteration to report in prices. Manganese arrivals have been large, but prices are without change. Magnesite (containing 98 per cent. of carbonate of magnesia) without alteration at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand): The demand is brisk, but prices are unaltered at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals are small and prices are still stronger; sales continue to be made at an advance of 5s. to 10s. per ton—85s. to 90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) continues scarce, especially the best quality, and prices are firm. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump. 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumicestone in fair inquiry; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore: The improvement has been maintained; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone is inquired for at £5. 5s. to £5s. 15s. for lump, and smalls £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore: The demand last reported continues, and prices are firm. Antimony ore firmer; £16 to £22 for fair quality. Antimony metal from £50. Uranium, 29s. to 32s. 6d. Asbestos: Best £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## THE LIVERPOOL COLOUR MARKET.

There is no change to report. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of Zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## LIVERPOOL CHEMICAL MARKET.

Chemicals have ruled steady this week, and there is no change to report in prices. Soda-ash, 1d. up. Caustic soda: 60 % white, £6; 60 % cream, £5. 17s. 6d.; 70 % white, £7; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda: There is little improvement at 9s. 6d. to 10s. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump. £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution. £3. 12s. 6d. Bleaching powder, £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 21s. 6d. Bichromate of potash, 4¾d. Bichromate of soda, 3¾d. Carbonate of potash, £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8¼d. per lb. Arsenic, £10. 17s. 6d. to £11. Lump is not offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best Englsh make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic): strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12s. 5d. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Chloride of zinc (solid) £18.

## MISCELLANEOUS CHEMICAL MARKET.

Business has been somewhat interrupted by holidays during the past week, and there are few changes to note in the course of prices. White powdered arsenic has been advanced, and best Cornish makes now command £11 nett per ton f.o.b. Sulphate of copper is still offering from second hands at £21 to £22 per ton, but makers are firm at £23. Acetates of lead still continue quiet. Brown acetate of lime has been meeting with better sale at the lower prices, but acetic acid and other products are difficult to move. The quietness of trade with calico printers and dyers in Lancashire and Yorkshire has had considerable effect upon the demand for chemicals of many kinds. Sulphocyanides are more freely offered, and prices are weak in consequence of small demand. Zinc chloride is moving off freely. Tin crystals are nominally 10d., but little business doing. Soda ash and crystals are meeting with fair demand, and there is no change in prices as a whole. Bleaching powder is in good demand at £7. 7s. 6d. (softwood) on rails. Potash, carbonate, and caustic, are without change in price, and selling freely.

## THE ALKALI TRADE.

The holidays have seriously interfered with business in this department of chemical manufacturing, and not only have caustic and carbonate of soda declined in value, but there are serious thoughts that bleaching powder is about to fall also. The acid trade seems in a very bad way, and makers are grumbling, not alone of the lowness of price, but of the paucity of orders. In muriatic acid bleachers have been striving to reduce their consumption to the lowest possible limit, and the producers of it have yet to learn that the addition of 1d. per carboy, which we pointed out to them would have a serious effect on their trade, was a most unwise step in the present position of the bleaching industry. Other products intimately connected with the alkali trade are in about as bad a condition as alkali itself, and nothing but serious reductions all round are spoken of. The fact is that there is vastly too much soda being made, and this is a question the trade should take seriously in hand.

## THE TAR PRODUCTS MARKET.

This market is unusually flat, and though anthracene still keeps up its value and is expected to rise still higher, there is no doubt that most other products are not quite so firm. Even carbolic acid, which many thought would maintain its position for a long time to come, gives some indication of approaching weakness. If, however, a serious epidemic of the various prevalent diseases should visit us again this spring and summer, it is quite possible that carbolic acid may find favour as the disinfectant, and in such a case the demand would cause the market to harden again.

With regard to benzols nothing can be said; both qualities drag on their weary existence, and one cannot hear of any piece of healthy business which has been done in this article. The *London Commercial Record* states 90's benzol to be worth 3s. 2½d. and 50/90's 2s. 7d., but these prices may be varied very considerably if the seller is anxious to sell or the buyer anxious to buy. The condition of the market must be causing much anxiety to those who hold stocks, and also to those who are even now only working their carbonising plant to less than one half of its capacity. We have no hesitation in saying that if the demand was good double the quantity of carbonising benzol could be put into the market in a week's time if circumstances demanded it.

## THE SULPHATE OF AMMONIA MARKET.

Notwithstanding the Easter holidays and the severity of the weather sulphate looks decidedly more healthy than it did a week ago. At Hull there have been buyers at £11. 17s. 6d., but as makers have held out for £11. 18s. 9d. this latter price has been obliged to have been paid. Most of the business which has been done during the past few weeks has been by speculators, and it may turn out that they have done a good stroke of business, for, in the event of a good demand springing up about the middle of this month, prices would be sure to rise. On another page may be found some beetroot sugar statistics, from which it may be inferred that sulphate will be wanted about the middle of this month for that department of agriculture. The Leith market has not been quite so firm during the past week, and prices are quoted from £11. 15s. to £11. 17s. 6d. In London £12 to £12. 5s. is about the value. We have heard of business being done at both these prices.

# Gazette Notices.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

Smethurst, William, Hyson Green, Nottingham, late of Bryn, near Wigan, mining engineer.
Isherwood, Joseph, Denton, Lancashire, hat manufacturer.
Wyatt, Henry, Southall, Middlesex, late of Hounslow, oil and colourman.

### PARTNERSHIPS DISSOLVED.

Jones & Shannon. Liverpool, aerated water manufacturers.
Oddy & Murgatroyd, Rawdon, near Leeds, stone merchants and quarry owners.

#### First Meetings and Public Examinations.

Stanford, Enoch (trading as E. Stanford & Co.), Newport, Mon., and Tynewydd Tin Works, near Newport, tin-plate manufacturer. April 9, Queen's Hotel, Newport. April 6, County Court, Newport.

#### Notices of Dividends.

Sims, Henry (trading as Sims Brothers), Harewood, Calstock, Cornwall, and Chillaton Manganese Mines, Milton Abbott, Devonshire, manganese merchant and miner. Second and final dividend of 6½d., April 6, 23, Westwell-street, Plymouth.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street Finsbury, London, and at Paris and Brussels.*

#### APPLICATIONS FOR LETTERS PATENT.

**Automatically Closing Water Gauges.** F. Barber. 4450. March 23.
**Improved Tap for Liquids.** J. Sykes and T. Cook. 4466. March 23.
**Lamps.** R. D. Bowman. 4471. March 23.
**Blue Colouring Matters.** J. Y. Johnson. 4476. March 23.
**Washing and Steeping Barley.** K. Bernreuther and W. Kumpfmiller. 4478. March 23.
**Manufacture of Floor Cloth.** C. F. Leake, C. E. Lucas, and H. W. Godfrey. 4482. March 23.
**Floor Cloth.** C. F. Leake, C. E. Lucas, and H. W. Godfrey. 4483. March 23.
**Manufacture of Illuminating Gas.**—(Complete Specification.) J. E. Wren. 4484. March 23.
**Extracting Gold and Silver.** F. Maddick and J. Greenwood. 4485. March 23.
**Holders for Electrical Lamps.** E. F. H. H. Lauckert and E. H. Haensel. 4489. March 23.
**Transferring Metal from One Set of Rolls to Another.** D. Evans and A. Harrison. 4490. March 23.
**Safety Lamps.** E. Edwards. 4491. March 23.
**Making Joints Between Metallic Surfaces.** C. Appleby. 4492. March 23.
**Improvements in the Manufacture of Butter and Cheese.** T. Adair. 4495. March 24.
**Injectors.** E. W. Jones. 4500. March 24.
**Decorating Pottery.** A. F. Wenger. 4502. March 24.
**Domestic Gas Engine.** H. J. Warsop. 4515. March 24.
**Portable Galvanic Batteries.** W. J. S. Barber-Starkey. 4524 March 24.
**A Process of Photographing in Colours.** J. B. Germeuil-Bonnaud. 4537. March 24.
**Rotary Pumps.** F. Correa. 4539. March 24.
**Apparatus for Testing Colour Blindness.** K. Grossman. 4541. March 24.
**A New Form of Lecture Lantern.**—(Complete Specification.) W. C. Hughes. 4545. March 24.
**Moving or Transporting Stone.** A. Gill. 4546. March 24.
**Separating Solid Matter from Water.** T. L. Seaton. 4547. Mar. 24.
**Utilisation of Heat from Oil Lamps.** D. Nicoll. 4549. March 24.
**Bakers' Ovens.**—(Complete Specification.) G. S. Baker. 4553. Mar. 24.
**Preparation of Fibre from Rhea Grass.** W. B. Nation. 4558. Mar. 24.
**Arc Lamps.** F. de Wolfers. 4559. March 24.
**Battery Jar.**—(Complete Specification.) C. A. Brown. 4561. Mar. 24.
**Accelerating the Draught in Fire-places.** A. Howarth and E. Horrocks. 4570. March 26.
**Apparatus for Preventing Incrustation in Steam Boilers.** R. A. Dent. 4590. March 26.
**Improvements in the Methods of Mixing Metals.** J. A. B. Bennett. 4594. March 26.
**Aluminium Chloride.** J. A. B. Bennett. 4595. March 26.
**Manufacture of Compressed Leather.** A. E. Arnold. 4608. Mar. 26.
**Improved Porous Surfaces for Absorbing Liquids and Gases.** F. H. Glew. 4609. March 26.
**A New Alpha-naphtholdisulphonic Acid.** C. D. Abel. 4625. March 26.
**The Electrolytic Production of Metals.** C. Hoeppner. 4626. March 26.
**Improved Method of Using Incandescent Lamps.** C. Wells and F. J. Goad. 4627. March 26.
**Preparation of Liquid Extract of Meat.** S. M. Caffyn. 4631 March 26.
**Manufacture of Tiles.**—(Complete Specification.) H. A. Cawkwell. 4632. March 26.
**Automatic Valves for Closing Water-gauge Glasses in case of Fracture.** S. Tommis and A. E. Whitwham. 4633. March 26.
**Utilising Waste Heat for Motive Power.**—(Complete Specification.) C. Tellier. 4637. March 26.
**Ice Machines.** F. N. Mackay. 4645. March 27.
**Production of Sulphur from Sulphuretted Hydrogen.** E. W. Parnell and J. Simpson 4648. March 27.
**A New Process for Producing Carbonates and Hydrates of the Alkalies.** G. E. Davis. 4653. March 27.
**Briquettes.** J. A. Yeadon and R. Middleton. 4656. March 27.
**Disintegrators.** J. A. Yeadon and R. Middleton. 4657. March 27.
**Consuming Smoke.** R. Shackleton. 4661. March 27.
**A New Make of Barometer.** J. le Patourel and S. Hyams. 4668. March 27.
**Vapour Condenser and Water Heater.** R. Reichling. 4677. Mar. 27.
**An Improved Fire-extinguishing Compound.** A. J. Boult. 4684. March 27.
**Machines for Heating, Cooling, or Condensing Fluids.** A. Rathbone. 4689. March 27.
**The Improvement of Bottles Generally.** J. L. Robert. 4691. Mar. 27.
**Bottles and Stoppers for Delivering Liquids in Drops.**—(Complete Specification.) L. Friedrich and C. Graesser. 4693. March 27.
**Manufacture of Soda Water, etc.** H. Lane and M. Delmard. 4694. March 27.
**Improvements in Centrifugal Machines.** W. Bergh. 4698. Mar. 27.
**Improved Apparatus for the Expulsion of Chlorine from its Solutions.** W. D. Bohm. 4699. March 27.
**Measuring and Registering Liquids drawn from Casks.** H. L. S. Nicoll. 4700. March 27.
**Generating Steam from Hot Slag.**—(Complete Specification.) H. H. Lake. 4707. March 27.
**Generating Steam from Hot Slag.**—(Complete Specification.) H. H. Lake. 4708. March 27.
**Apparatus for Generating Steam from Hot Slag.**—(Complete Specification.) H. H. Lake. 4709. March 27.
**Apparatus for Generating Steam from Hot Slag.**—(Complete Specification.) H. H. Lake. 4710. March 27.
**Mechanism for Registering Vacuums.** S. Gerry. 4719. March 27.
**Gas and Vapour Engines.** C. Ridealgh and C. J. Fairman. 4740. March 28.
**Rule for Gauging Casks.** G. D. Ham. 4745. March 28.
**Automatic Separator and Purifier.** P. A. Maignen. 4760. March 28.
**Treatment of Bones and Animal Waste.** A. H. Hobson. 4765. March 28.
**Filter Presses.** S. H. Johnson and C. C. Hutchinson. 4766. Mar. 28.
**Manufacture of Chlorine.** C. T. Kingzett. 4767. March 28.
**Apparatus for Evaporating Sea Water.** O. M. Row. 4775. Mar. 29.
**Mercury Pumps.** F. J. Smith. 4780. March 29.
**Cleaning and Polishing Tin and Terne Plates.** F. Player. 4784. March 29.
**Automatic Fire Extinguisher.** W. Rabbit. 4787. March 29.
**Heating and Drying Chambers.** S. Ibeson. 4815. March 29.
**Accelerating the Passage of Liquids through Filter Beds.** W. D. Bohm. 4824. March 29.
**Extinguishing Fire by Carbonic Acid.**—(Complete Specification.) C. Bade. 4827. March 29.
**Filtering Funnels.**—(Complete Specification.) B. Nickels. 4831. March 29.
**Artificial Fuel.** W. Lindsay. 4833. March 29.

# New Companies.

Alliance of Mineral Water Manufacturers' Association Limited. Capital £2,000 in £1 shares.

Animal Vaccination Company Limited.—Capital, £2,000 in £1 shares.

British Fish Culture Society Limited.—Capital, £50,000 in £1 shares.

Cellular Clothing Company Limited.—Capital, £25,000 in £10 shares.

Mysore Reefs Company Limited.—Capital, £150,000 in £1 shares.

Petroleum Engine Company Limited.—Capital, £100,000 in £5 shares.

Spirits Patents Syndicate Company Limited.—Capital, £4,000 in £1 shares.

Thos. Turner and Company Limited (Glass Bottle Manufacturers). Capital, £60,000 in £5 shares.

Tyddyn Mawer and North Wales Exploration Gold Mining Company Limited.—Capital, £30,000 in £1 shares.

Universal Digestive Tea Company Limited.—Capital, £20,000 in £10 shares.

# PRICES CURRENT. [THURSDAY, April 5, 188

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 9 | 0 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... ... ... ... ... per lb. | 0 | 0 | 6 |
| Fluoric ... ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2¼ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 3½ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 6½ |
| Sulphuric (fuming 40 %) ... ... ... per ton | 15 | 0 | 0 |
| ,, (Brimstone, 168°) ... ... ,, | 3 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ... ,, | 1 | 15 | 0 |
| ,, (Pyrites, 150°) ... ... ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 6½ |
| Arsenic, white powdered... ... ... ... per ton | 11 | 7 | 6 |
| Alum (loose lump) ... ... ... ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, 880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 48 | 0 | 0 |
| ,, ,, (pure) ... ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 2 | 6 |
| ,, ,, (grey), Hull ... ... ,, | 11 | 18 | 9 |
| Aniline Oil (pure) ... ... ... ... ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ... ... ... ... ,, | 0 | 0 | 8½ |
| Antimony ... ... ... ... ... ... ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... ... ... ... ... per ton | 7 | 15 | 0 |
| ,, Carbonate (native) ... ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 12 | 0 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ... ...per gallon | 0 | 3 | 4 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 3 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 3 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 2½ |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 80 | 10 | 0 |
| ,, Sulphate ... ... ... ... ... ,, | 22 | 0 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 80 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 15 | 15 | 0 |
| ,, Litharge Flake, ex ship ... ... ,, | 16 | 10 | 0 |
| ,, Acetate (white) ,, ... ... ... ,, | 26 | 15 | 0 |
| ,, ,, (brown) ... ... ... ... ,, | 22 | 5 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 17 | 15 | 0 |
| ,, Nitrate ... ... ... ... ... ... ,, | 23 | 0 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 9 | 2 | 6 |
| ,, ,, (grey) ... ... ... ... ,, | 13 | 15 | 0 |

| | £ | s. | d |
|---|---|---|---|
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | |
| Manganese, Sulphate ... ... ... ... ,, | 17 | 10 | |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 2 | |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 12 | |
| Methylated Spirit, 60° o.p. ... ... ...per gallon | 0 | 2 | |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 | |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | |
| **Oils:—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 3 | |
| Cotton-seed ... ... ... ... ... ... per ton | 21 | 0 | |
| Linseed ... ... ... ... ... ... ... ,, | 19 | 10 | |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 | |
| ,, American ... ... ... ... ,, | 0 | 0 | |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 16 | |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 | |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 10 | |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 15 | |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | |
| ,, Permanganate ... ... ... ,, | 4 | 5 | |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | |
| ,, Sulphate, 90 % ... ... ... per ton | 10 | 10 | |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 10 | |
| Silver (metal) ... ... ... ... ... per oz. | 0 | 3 | |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 16 | |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 11 | |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 10 | |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | |
| ,, Acetate (ex ship) ... ... ... ,, | 19 | 10 | |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | |
| ,, Borate (Borax) ... ... ... ... per ton. | 30 | 0 | |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | |
| ,, Hydrate (77 % Caustic Soda)... per ton | 7 | 15 | |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 2 | |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 12 | |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 12 | |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 12 | |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 5 | |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 10 | |
| ,, Manganate, 30/33 ... ... ... ,, | 10 | 0 | |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 | |
| ,, Nitrite, 98% ... ... ... ... per ton | 28 | 0 | |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 1 | |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 12 | |
| ,, Sulphide ... ... ... ... ... ,, | 8 | 15 | |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 5 | |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 | |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 14 | |
| ,, Cane ... ... ... ... ... ... ,, | 0 | 16 | |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | |
| ,, Barium ... ... ... ... ,, | 0 | 0 | |
| ,, Copper, 60% ... ... ,, | 0 | 0 | |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 0 | |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 2 | |
| Tallow ... ... ... ... ... ... ... ,, | 26 | 0 | |
| Tin (metal) ... ... ... ... ... ... ,, | 158 | 0 | |
| ,, Crystals ... ... ... ... ... ... per lb. | 0 | 0 | |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 18 | 15 | |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, April 14, 1888.**


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Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

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As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

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## SPECIAL NOTICE.

OUR readers will observe that we publish in this week's issue a summary of the principal Chemical Products exported from the United Kingdom up to as late a date as the time of our Journal going to press will permit. The list will be continued weekly, and we trust will prove of practical benefit to our subscribers. In due course it is our intention to add the principal Chemical **Imports,** and we have to express our thanks for the many valuable suggestions we have received from our subscribers in connection with this subject. We cannot, of course, include in our lists every Chemical product, but we shall endeavour to make them as comprehensive as possible, and we shall at all times be willing to receive suggestions that are likely to add to the value of these summaries.

## PATENT LITIGATION.

IN our last article upon this subject we endeavoured to point out several things which those interested in the Patent question might do well to consider. The first question, which anyone taking out a chemical patent will have to meet, will be the absolute necessity of thoroughly investigating a process before he files his complete specification, and so avoid making claims which may invalidate the whole of the document. There are many side issues which conduce to much litigation, and it is all very well in the abstract to give a patentee good advice, but it is not always so easy to carry that advice into actual practice. A patent agent would say, for instance, "come to me and I will see that the patent is properly worded and your claims made as wide and comprehensive as possible." With the majority of patent agents this course is a common one, and many of them have failed to see that in the comprehensiveness of the specification and of the claims appertaining thereto, lies the weakness of the whole business. This can easily be seen by reference to the Spence *v.* Kurtz case, indeed, we cannot say that the complete specification of either of the litigants was what a specification should be, either in lucidity of language or as claiming any particular method. We ought not to blame the patent agent too much for chemical faults; the chemistry of the process and the onus of putting the document into proper chemical language clearly belong to the patentee. Unless a patentee knows perfectly well what his process is, what he has discovered, and how much of that is new, it is quite clear that his specification cannot be properly worded, but if he does know what he has discovered and what he wishes to obtain protection for, he should be able to supply the chemical information? But, apart from this, the patent agent has his duties, he should see that the specification is drawn up in clear and definite language; if any doubts arise in his mind as to what the patentee actually means he should take pains to have this properly explained to him by the patentee himself, and if needs be call in the assistance of a chemical expert to consult with the patentee and himself upon any matter which remains in doubt. The cost of such a proceeding would be but small, and if the patentee insisted upon this method of procedure he would find it much to his interest, as he would see that the bringing in of some outside knowledge would, in most cases, be of the utmost value. As it now happens, a man thinks he has made a valuable discovery,—in the heat of the moment he rushes off to procure a patent form, and on it inscribes in hasty language what he wishes to protect; then comes the time when the complete specification has to be filed and his claims made, which may

possibly some years afterwards, have to stand the rigid scrutiny of a court of law.

We do not say the patent agent is by himself absolutely infallible in deciding the all-important matter of what the claims should consist, but in most cases he can render invaluable aid in putting matters into the proper shape for perusal by one of those eminent counsel, who have made the patent law their study. What we hold to be an absolute necessity is that no one should apply for provisional protection for a patent without he knows beforehand what he wishes a monoply granted to him for, and if the subject is worthy of the grant of a monoply, then he should take most energetic measures to secure some advantage to himself by the possession of it.

Now this cannot be better done than by spending a small sum in a consultation with counsel; there need be no trouble on the part of the patentee himself, his patent agent makes the appointment with counsel, with whom the specification is left. Counsel duly considers both the specification and the claims, and during a brief consultation, expresses to his clients his opinions upon the whole matter. If the patentee regards the advice given to him, there is no doubt he will possess a more valuable patent than the majority which are taken out and carried through in a very slipshod manner.

But we are supposing that the patentee has before the time, when it has become necessary to file his complete specification, proved the real value of the process. In many instances it is impossible to do this on a large scale, but there is no reason whatever why large scale laboratory experiments should not be carried out, in order to find the exact point on which the claims should be based. We know of many instances where the complete specification has been filed, without a single practical experiment having been made upon the process in question, and the holders of such patents are very much surprised when they find the greatest value the patent has, is that amount of money which has been expended in fees. We hold, therefore, that three things are necessary: First, the employment of a patent agent of repute; secondly, a trial of the process on a scale intermediate between the laboratory experiment on the one hand, and the manufacture on the large scale on the other, and from such an experiment the claims should be based. The third point consists in a consultation with counsel, before filing the complete specification, who will advise what is best to be done under the circumstances.

## ANILINE BLACK AND ITS APPLICATION.

BY DR. SCHILLER.*

BY means of the oxidation of amines of the aromatic series we arrive at a class of colours which, in consequence of their insolubility in the ordinary means of solution, can only find suitable application in dyeing and printing when the oxidation which generates the colouring matter is effected upon the fibres themselves. One of these colouring matters is aniline black, which has attained very great importance in technical dyeing. In spite of very numerous experiments, it has hitherto been found impracticable to express the composition of aniline black by means of a formula. According to Goppelsroeder, the hydrochlorate is said to have the formula $C_{24}H_{20}N_4HCl.$, while according to Nietzki it is said to be a multiple of $C_6H_5N$, while in all probability it is in reality $C_{25}H_{23}N_5$. Aniline black is, as we have already mentioned, a product of oxidation. The means of oxidation employed can be—*a*, from bichromate of potash and sulphuric acid, and *b*, permanganate of potash; mainly, however, metallic salts are employed, which, under the influence of a lower stage of oxidation, easily emit their oxygen, but which by means of chlorate of potash become oxidised afresh, consequently playing the part of a carrier of the oxygen to the aniline as long as it remains possible to effect a regeneration of the higher stage of oxide of the metallic salt at the expense of the oxygen of the chlorate. While chlorate of potash of itself is hardly capable of oxidising the aniline, the oxidation proceeds with greater rapidity when a small amount of copper salt is present. Again, salts of iron, chrome and osmium have been employed, without any great advantage resulting, and without being able to suppress the copper.

If we warm a solution of 40 parts aniline hydrochlorate, 20 parts chlorate of potash, 40 parts copper sulphate, and 16 parts salammoniac in 500 parts of water up to 60° C., it becomes an easy matter to produce aniline black in substance. The action of this combination has been attempted to be explained by the easy manner of decomposition of the copper chlorate $2KCl.O_3+Cu.SO_4=K_2SO_4+Cu.(Cl.O3)_2$ which takes place at a temperature of even 60°.

The production of aniline black by the electrolytic process, by the action of the galvanic current upon solutions of aniline salts is of considerable importance. The oxidising action is exercised by the oxygen, which becomes separated, and in consequence the black colouring matter is separated in the form of a black deposit upon the positive pole.

As a means of oxidation the salts of vanadium act in an unequalled manner, and have consequently attained immense importance in the production of aniline black. The method above described for the production of aniline black in substance, at the same time furnishes the principle for producing the colouring matter upon the yarn. The original process, invented by Lightfoot in 1863, for applying aniline black to cotton textiles by means of printing indicates, as the component parts of the dye, aniline with hydrochloric acid, copper chloride, and chlorate of potash—at that time Lightfoot substituted sulphate of copper for the chloride of copper. The formula for the composition of this printing colour is in a literal sense in use at the present day. In conjunction with sulphate of copper, pure aniline oil is now used in place of the aniline hydrochlorate prior to printing, adding in equal parts the corresponding quantities of 36° nitric acid and acetic acid of 6° B.; or in place of the copper combination the combination of vanadium already referred to is used. The colour for printing is produced either from aniline salt or from aniline oil and chlorate of potash, to which, shortly before printing, the corresponding quantity of muriatic acid has been added. The discoverer of aniline black, Lightfoot, has already admitted the peculiar action of the salts of vanadium; but it was only in consequence of the experiences gained by Guyard, and published by him in 1876, which led to the general use of the same. According to the latter, 1 part of vanadium chloride will suffice to turn 1,000 parts of salt acid aniline into black, in the presence of chlorate of potash, without any elevation of the temperature.

The activity of the salt of vanadium as a conductor of oxygen consists in this, that the vanadium chloride formed is at once conducted from the chlorate of potash into the active vanadic acid. According to recent experiments the sulphate of cerium is reported equal to vanadium in its effect, but this latter must be preferred on the grounds of cheapness. In the composition of the printing colour, when aniline salt instead of aniline oil and muriatic acid is used, some attention must be paid to the qualities of the same. It is far more advantageous to use the purest aniline and that which is free from orthotoluidine, which imparts a blue tinge to the black, as also that which is free from paratoluidine, which furnishes unpleasant brown-black shades.

Aniline black is distinguished for its great power of resistance against light, air, and water; but for manufacturers it possesses the undesirable attribute of becoming green after a time,—that is to say that the finished, printed textiles, when stored, assume a greenish tone. By mere washing with any alkaline reagent, even with soap, the colour becomes reinstated. It is supposed that this after-greening originates from the presence in the air of the storage spaces of some acid or another, probably the sulphurous acid generated by the burning of illuminating gas. It is, however, possible that it results from the 4 to 5 per cent. chlor contents of the aniline black, furnishing hydrochloric acid under the action of air and of moisture.

In the application of acid methods of oxidation, as for instance, a solution of bichromate of potash acidulated with sulphuric acid, an effective means has been discovered of obtaining a non after-greening black. It would appear that by some means or other the chrome or iron lakes are formed, inasmuch as a considerable quantity of the metallic oxide becomes absorbed from the baths.

* A paper read before the Chemical Association of Köln, March 16, 1888, by Dr. Schiller, of Ehrenfeld.

# NITRATE OF SODA STATISTICS FOR 1887.

| NAME OF FIRM. | Total power of production after the estimate of the committee of the syndicate. | Quantities actually exported during 1887 by each producer in qx. esp. of 46 K. | Difference between the quantity actually exported and that which could be made by each producer. | Percentage of that exported to the total producing power of the establishment. |
|---|---|---|---|---|
| Gibbs and Co. | 3,480,000 | 1,514,360 | 1,965,640 | 43·51 |
| *J. Zayas and Co. | 1,860,000 | 1,062,494 | 797,506 | 57·12 |
| Folsch and Martin | 1,908,000 | 851,006 | 1,056,994 | 44·61 |
| Campbell, Outram, and Co. | 1,872,000 | 810,480 | 1,061,520 | 43·29 |
| Compagnie de Salitre de Liverpool | 1,680,000 | 711,975 | 968,025 | 42·37 |
| J. Sanguineti and Co. | 900,000 | 633,625 | 266,375 | 70·40 |
| J. Gildemeister and Co. | 2,100,000 | 632,021 | 1,467,979 | 30·09 |
| Compagnie de Salitre de Antofagasta | 2,040,000 | 612,911 | 1,427,089 | 30·04 |
| Morris and Granadino | 930,000 | 554,299 | 375,701 | 59·60 |
| Granja, Dominguez, and Lacalle | 756,000 | 500,452 | 255,548 | 66·19 |
| Loayza and Pascal | 1,152,000 | 460,682 | 691,318 | 39·98 |
| Barreda and Schroder | 780,000 | 398,504 | 381,496 | 51·09 |
| North and Co. | 840,000 | 395,266 | 444,734 | 47·05 |
| Keating and Quaet Faslem | 1,680,000 | 384,413 | 1,295,587 | 22·88 |
| José Devescovi | 720,000 | 377,289 | 342,711 | 52·40 |
| J. T. Humberstone and Co. | 540,000 | 374,548 | 165,452 | 69·36 |
| Juan Vernal and Castro | 600,000 | 346,450 | 253,550 | 57·74 |
| Georgeson, Rawson, and Co. | 900,000 | 344,159 | 555,841 | 38·23 |
| Jorge, E. Broohing | 480,000 | 289,076 | 190,924 | 60·22 |
| Banque Mobilière | 912,000 | 288,749 | 623,251 | 31·66 |
| Glavich, Stiepovich, and Co. | ..... | 281,586 | ..... | ..... |
| Compagnie Colorada | 1,200,000 | 268,651 | 931,349 | 22·38 |
| Retzlaff and Charme | 600,000 | 257,732 | 342,268 | 42·95 |
| †Zoulcovich and Framchevich | 240,000 | 240,074 | ..... | 100·00 |
| Daniel Oliva | 960,000 | 239,886 | 720,114 | 24·98 |
| E. Canningham and Co. | 720,000 | 238,169 | 481,831 | 33·07 |
| Pietro Perfetti | 422,400 | 227,429 | 194,971 | 53·84 |
| Galté and Co. | 540,000 | 209,434 | 330,566 | 38·78 |
| Watters Hnos | 540,000 | 208,006 | 331,994 | 38·52 |
| Saez and Lara | 648,000 | 195,820 | 452,180 | 30·22 |
| Weingardt and Brandt | 480,000 | 177,308 | 302,692 | 36·93 |
| Ugarte, Cevallos, and Co. | 600,000 | 156,802 | 443,198 | 26·13 |
| Devès Frères | 420,000 | 147,911 | 272,089 | 35·21 |
| Drew and Co. | 372,000 | 138,522 | 233,478 | 37·23 |
| Corssen and Brandt | 360,000 | 134,555 | 225,445 | 37·37 |
| Chinchilla, Saez, and Co. | ..... | 124,184 | ..... | ..... |
| E. Quiroga and Hno | 300,000 | 120,080 | 179,920 | 40·02 |
| Sanz and Co. | 360,000 | 93,407 | 266,593 | 25·94 |
| Caratps and Pirretas | 720,000 | 81,502 | 638,498 | 11·32 |
| Pascual Sciammaro | 96,000 | 46,360 | 49,640 | 48·30 |
| C. F. Comber and Co. | 360,000 | 42,100 | 317,900 | 11·69 |
| Antonio Hameau | 66,000 | 36,682 | 29,318 | 55·58 |
| Romanelli and Decher | ..... | 35,000 | ..... | ..... |
| Compagnie Flor de Chili | ..... | 33,038 | ..... | ..... |
| C. H. Heuser | ..... | 16,516 | ..... | ..... |
| Nicholas Zevallos | 72,000 | 6,142 | 65,858 | 8·53 |
| TOTAL | 36,206,400 | 15,299,655 | 21,400,143 | |

* Stopped for three months by decision of the Committee.

† Have increased their installation. —*L'Engrais.*

## THE SUPPRESSION OF CALCINATIONS AT HUELVA.

THE grave question of open-air calcinations has resulted in a manner which will completely satisfy the necessity of putting an end to the increase of the same with all the unhappy consequences which they would bring, while the details do not inspire us with interest; and inasmuch as we have said sufficient here to place the question in this field, we are now disposed to call it multiplied, if suited, so that the companies far from resenting in their own interests what has been prescribed, have found in the same the commencement of a new era of prosperity and development.

Some who believe they are able to defend the mining interest better than ourselves, inasmuch as they sustain the unusual pretensions of the companies to augment the calcinations without any limit whatever, have promulgated the idea, in their defensive ardour, that the pyrites mines of Huelva will be rapidly exhausted. We held the contrary opinion, and considered that they would last for very many years if only the quantities of to-day were extracted; and both in this and the certainty of a constant increase in the demand for copper, is where we have seen the dangers of an increase to incalculable quantities. To this greater extraction, which we attributed to the dangers of the system of open-air calcination, we expressed a cherished hope for the future without it; for if in the first instance it would have to be accompanied by evils, in the second it would naturally bear with it other mixed blessings.

The immense quantities of copper contained in the subsoil of Spain are beyond dispute, while at the same time it has been practically demonstrated that it is the country where this metal can be produced most cheaply, therefore if consumption increases the production will have to increase likewise, consequently it becomes necessary to be prepared for this eventuality, and not to view the matter with doubts and fears. In none of the applications for which copper is at the present day utilised do we see any convenience

in substituting any other metal for it, while all these are on the increase; more locomotives are being continually constructed; every day more dynamos are being manufactured; the nets of telegraph and telephone wires are continually being multiplied; the conductors for the distribution of electricity are made of copper, while if to all this we add the immense application that in the near future will be made of siliceous bronze, of aluminium bronze for artillery, for hulls of smaller vessels, and other multitudes of objects, we must not overstep the mark in predicting that the present (annual) consumption of 220,000 tons will in a few years be doubled. When to this is added that there is every cause of foundation for the belief that Spain may receive its due proportion of the same, then what would be the position of the Province of Huelva if the opportune decree of Signor Albareda would require the future production there to be under distinct conditions as compared with the past? From all points that which has been ordered creates a new era in the production of copper from poor pyrites, and in view of the same it is of the profoundest necessity for us to study the consequences which may result from the decree. At the prices which are ruling for copper, at which the Spanish producers are gaining more than cent. per cent. upon the cost of production, it is impossible to believe that the madness will arise of checking or stopping the output of the mines in order to dedicate the time to make out claims for losses against the Government, which would only problematically prosper if they were demonstrated, as appears possible, inasmuch as no real and actual loss will accrue to the companies in changing the system to one which will not possess the inconveniences of the former, and which can only be sustained by the evil intention of not wishing to get out of it. However, if the present companies do not apply themselves to the situation, as such does not either modify the existence of copper in Spain nor the demand for this metal in the open market, and if they do not make it themselves other enterprises will be brought forward in other quarters which would be disposed to adopt every means for obtaining copper without the emission of sulphurous vapours, and as this is assuredly a problem which has its solution in principle, and in which doubts only arise in matters of detail, if the old companies leave the field open to new ones, these latter will see through matters, and without a doubt triumph over all the difficulties. It is, therefore, a logical consequence of the present situation that all the chemical and metallurgical capacities of Spain and elsewhere will have their eyes fixed on the study of this question, and it is well understood that we are not treating of a recourse which does not exist for treating the poor pyrites without open-air calcination, but only to discover some better methods than those now employed in various cases and which may possess inconveniences when carried on in a general manner. By what we understand, the most inconvenient system for the mines, which have an output of enormous quantities, is that of natural vitriolisation, inasmuch as the same requires the pulverisation and keeping in treatment of the mineral during a period of many years, and consequently large tracts of prepared land become requisite for depositing, in conjunction with elements for assisting the watering of the heaps, inasmuch as it is moisture which plays an important part in the transformation. If this system possesses those inconveniences, on the other hand we have been able to uphold, where it has been applied, that it is cheaper than calcining in the open air, and that it causes the mineral to produce a greater proportion of the copper which it contains than that by the former system, which is now for the future prohibited.

But if these difficulties of pulverisation, of prolonged treatment, and of the occupation of much space necessitating the transportation to great distances of the mineral obtained appear to be very great, the companies must not ignore the fact that under the direction of Dr. Fabien experiments on a fair scale are being carried out at Duisburg with Rio Tinto minerals themselves, a system which in the laboratory has furnished results, and which tend to accelerate the operations in such a manner that while under the system of open-air calcinations the results were only obtained after many weeks the new system will arrive at them in twelve to fourteen days. Fortunately this system only requires some sulphuric acid and salt, which demonstrates at once that in essence it is a cheap system in the Province of Huelva.

On our part we cannot resist the desire to make public that an illustrious Spanish chemist and mining engineer has studied and satisfactorily solved the problem of converting the sulphurous acid of the enemy into a valuable auxiliary for the obtainment of copper, etc., with great economy for the aforesaid companies, and we only regret that we are not authorised to publish the details of this interesting process.

Finally, the possibility is a rudimentary one of fixing the sulphurous acid by means of lime; the apparatus and the *modus operandi* may vary more or less, but this is a recourse to the altitude of necessities.

With such means, and with others that may exist and of which we are not yet cognisant, it is beyond doubt that the consequences of the decree, whether for the old companies or the new, will employ exclusive or mixed systems which will not emit the sulphurous vapours into the atmosphere.

These consequences possess yet another point of view. If the system which is to take the place of the present one does not surcharge the cost of the copper much, or even a little, which possibly may be the case, it is doubtful whether the fortuitous consequences will be otherwise than to carry the change into effect more or less gradually, going on increasing the production; but if the imperative necessity of changing the system, so that it disperses the sulphur, turns out more costly than the present one, then a natural defence is found, as well as an assistance, by utilising of the total output that portion of the brimstone which is practicable, either for use in the soda industry or for that of the superphosphates, in conjunction with minerals from Cáceres, from Logrosán, and other parts, and from the very moment when these industries become created in the Province all those which are based upon sulphuric and hydrochlòric acids will be able to be produced there at the lowest price in the world. However great may be the decadence at the present time, and however little lucrative may be the soda industry in England at this moment, it is quite possible that it may result that the article may be produced at a less price in Huelva. This is a matter which time alone can prove. If the soda industry is carried on in the Province of Huelva alone on the necessary scale for the consumption of Spain, but very scanty as it certainly is, or if it will be carried on to such an extent so as to enter into the universal market will depend upon our conception of the price at which coal from Belmez can be delivered at the Rio Tinto, or upon the relative prices at which there can be delivered at a place with abundance of water the sulphate of soda manufactured in Rio Tinto, as well as the Belmez coal.

From all this we can deduce that the consequences of the suppression of the vapours in the Province of Huelva, apart from creating there afresh an agriculture of another character to that which had previously existed, by the fact of being able to count upon obtaining superphosphates at the lowest price in the world—all this may tend to impart a character supremely industrial to that district, irrespective of the mineral and metallurgical increment which is certain to take place by the increase in the obtainment of copper, to which no opposition is made in the very minutest form, while it would be a fatal act if obstruction were offered by the voluntary acts of individuals or companies. We therefore understand, that apart from the fact of the intrigues which influential politicians and parties interested are seeking to carry on, under the pretext of suppression and some sacrifices to the country, no harm can be produced by the suppression of the open-air calcinations, while only good can be expected to result from the same.—*Revista Minera of Madrid.*

## A CHEMIST'S VIEW OF COTTON OIL.

THE most important evidence yet heard by the Senate Committee on Agriculture concerning lard compounds, was given on Saturday by Prof. Wiley, the well-known chemist of the Department of Agriculture, who summarised the result of his examinations of various samples of lard submitted to him by the committee. He stated that most of the samples contained cotton oil and he had no reason to believe that any of the ingredients found in the lard were injurious to health. The properties of cotton oil he regarded as nearly identical with the best olive oil and just as wholesome, therefore the former made an excellent substitute for culinary purposes, and argued that its sale should be encouraged instead of restricted by a proposed tax on lard compounds. Cross-examination by several members of the committee failed to change his opinion, as the intelligent witness fully understood what he was talking about and left a very favourable impression. It was demonstrated by the evidence that he is perfectly familiar with the subject, and the fact that he is a disinterested party labouring in an official capacity for the benefit of the general public, ought to have considerable weight with the committee.

Prof. Wiley not only detailed the progress of his chemical researches in other channels, but endeavoured to convince his hearers that they were labouring under an erroneous impression concerning the meaning of the word "adulteration," which usually covers a multitude of sins. We are to conclude from his testimony that improving an article of food by the admixture of wholesome materials like lard and cotton oil, could not be termed an adulteration. This is precisely what the *Reporter* has attempted to prove, and it is hardly necessary to refer to the published testimony of experts to show that this is the only reasonable view to take of the case, as every interested person is familiar with the question at issue. The statement of such a world-renowned chemist as Prof. Wiley ought to have a pronounced effect on the deliberations of the committee, and as he is the last witness to appear at the hearing, his opinion will be kept fresh in the minds of the senators. If the question is treated fairly on its merits and without prejudice, there can be no doubt about the defeat of the lard bill.

The decision of the committee is probably foreshadowed in the statement made by the chairman at the close, who incidentally remarked that it had been satisfactorily established that the refined lard of commerce is in no way injurious to health. A final report is expected in two weeks.

## THE LEAD INDUSTRY.

THE more one thinks of the damage that would be inflicted were the tariff to be stricken from lead, the more portentous becomes the danger. There is not much direct help that can be counted upon in the east, and there is a strong, consolidated interest that will work for the repeal of the law. Were the lead manufacturers of the east to expend $250,000 and carry the measure, they would get the whole sum back within twelve months. There must be a showing made of the magnitude of the interests involved—to the miners, to the transportation companies, and, indirectly, to the business men in every capacity in all that region between British Columbia and Mexico, and from the eastern base of the Sierras to the eastern base of the Rockies. It would give that whole region business paralysis, and it would, while aiming such a blow at the west, not only do no one any good in the east, except a few manufacturers, but would result in the draining of the country of millions of dollars which otherwise would be in general circulation. The immediate result would be the closing down of industries which yield at present not only the lead product of the county, but a large percentage of the gold and silver product; and the indirect effect would be, within three years, to enhance the cost of lead in this country to a higher figure than it now commands. Nevada, Idaho, Montana, Colorado, Arizona, and New Mexico should join with Utah and make such a presentation of facts in Washington as would make it impossible to carry through any legislation aimed at the tariff on either lead or copper.—*Salt Lake Tribune*.

## NICKEL PLATING SOLUTION.

ACCORDING to the *Bulletin Internationale de l'Electricite*, the following solution is employed for nickel plating by several firms in Hainault. It is said to give a thick coating of nickel firmly and rapidly deposited. The composition of the bath is as follows:—

| | | |
|---|---|---|
| Sulphate of nickel | 1 | lb. |
| Neutral tartrate of ammonia | 11·6 | oz. |
| Tannic acid with ether | 0·8 | oz. |
| Water | 16 | pints. |

The neutral tartrate of ammonia is obtained by saturating tartaric acid solution with ammonia. The nickel sulphate to be added must be carefully neutralised. This having been done, the whole is dissolved in rather more than three pints of water, and boiled for about a quarter of an hour. Sufficient water is then added to make about sixteen pints of solution, and the whole is finally filtered. The deposit obtained is said to be white, soft, and homogeneous. It has no roughness of surface, and will not scale off, provided the plates have been thoroughly cleaned. By this method good nickel deposits can be obtained on either the rough or prepared casting, and at a net cost which, we are told, barely exceeds that of copper plating.

## THE MANUFACTURE OF CHLORATE OF POTASH.

THE patent of J. W. Kynaston, numbered 14344 and dated November 6th, 1886, refers to improvements upon the ordinary process. Chlorine is conducted into milk of lime, the muriate of potash is added, and the "rough chlorate" separated from the mother liquor in the usual way. This mother liquor usually contains in grammes per litre:—

| | 71° Tw. at 56° F. | 68° Tw. at 58° F. | 68° Tw. at 58° F. |
|---|---|---|---|
| Calcium chloride ..... | 432·9 | 415·1 | 412·0 |
| Potassium chlorate ... | 27·2 | 30·7 | 26·9 |
| Potassium chloride ... | 15·6 | 1·0 | 17·8 |
| Sodium chloride ..... | 15·5 | 29·0 | 18·8 |
| | 491·2 | 475·8 | 475·5 |

This mother liquor is then placed in an iron vessel fitted with stirring appliances and heated by steam; water is added, the stirrers set in motion, while sufficient slacked lime is gradually added in order to transform half the chloride of calcium present into oxychloride. The mixture is cooled in flat iron pans, concentrated to its original volume, and the oxychloride filtered off. The filtrate is concentrated by evaporation to one-half of its original volume and cooled, by which means about one-half of the chlorate of potash is said to crystallise out. The mother liquor from these crystals is added to a fresh batch of lime undergoing treatment with chlorine. The oxychloride obtained is treated with water, and by heating it to the boiling point chloride of calcium becomes separated and flows away, and the hydrate of lime is used over again. The *Chemiker Zeitung*, in commenting upon this patent, says: "Whether by means of this process an actual progress has been made remains doubtful; under any circumstances it is only by very careful supervision and a sharp control of the work that losses in the chlorate manufacture can be avoided."

## THE TIN-PLATE TRADE.

ANOTHER ATTEMPT TO FORM A SYNDICATE.

A VOLUMINOUS circular dealing exhaustively with the above subject has been issued by Mr. P. S. Phillips, one of the leading tin-plate makers in the kingdom, and sent to all the other tin-plate manufacturers. Mr. Phillips has such great interests in several of the largest tin-plate works in Monmouthshire, such as Pontymister, Abertillery, Nantyglo and Blaina, etc., that anything he says or does is deserving of the best attention. He considers the present an opportune moment to take action on the part of the tin-plate makers, as the stocks of tin plates are down to the lowest point possible, and if all the works but stopped for a week or two there would not be a box of tin plates left in this country, and but very few in the States. He held aloof from the last attempt, as well as from some of the previous attempts to regulate the trade, for reasons then stated, but he thinks the circumstances have changed altogether, and it is now about the very best time possible to form a syndicate to regulate the production and price of tin plates. The chief points of the project are something like the following:—The syndicate is to be formed with a capital of £200,000, in shares of £100 each per mill in the various works. Every tin-plate maker, if he intends to join the movement, must take one share at least, so as to qualify himself for membership, and if he does not take more than one share the remainder of his shares, representing the number of his mills, will be offered to the other members in rotation as they stand on the list. Each share and mill will carry with it a vote for the owner, so that if the tin-plate maker has 10 mills and 10 shares he will be entitled to 10 votes, but if he only takes one share, it does not matter how many mills he has, it is only one vote he will be entitled to. A council of seven members will conduct the operations of the syndicate. £25 per share is to be paid up on registration, and £25 in a month afterwards, and the balance in monthly instalments when necessary. The selling prices fixed for coke tin plates are 14s. 9d. IC, 14·20, Welsh seaports; Bessemer steel coke tin plates, C 14·20, 15s., and 15s. 3d. for the same in C 14·19½ size; Siemens' steel coke plates, C 14·20, 15s. 6d. The tin-plate makers who cannot dispose of their plates at these prices in the ordinary course of business to the various tin-plate merchants are to hand them over to the syndicate, who will advance upon them to within 6d. per box

of the above prices to the makers. The plates will then be stored, and warrants issued, as is the case on such an extensive scale with Scotch pig-iron. Special brands of both tin plates and terne plates are to be excluded from this arrangement. We omitted to mention that the price of Allaway grade charcoal tin plates is fixed at 17s. IC 17·20, and ordinary charcoal and steel ternes at 17s. 6d. C 14·20, and 25s. C 28·20. A reduction in make is also to be carried out at once, and this to the extent of 20 per cent. Two independent assessors are to be appointed to go on a tour of inspection around the various works, and to see that this is carried out effectually. The reduction of 20 per cent. in make, to be altered to 10 per cent. later on if it will be found sufficient, will be based on the present capacity of the various mills, the output of the largest, newest, and best being computed at 650 boxes per mill per week, and the next size 550 boxes per week, whilst the smaller ones and water mills will be reckoned as capable of an output of 450 boxes per week, so that each works will be assessed *pro rata* in accordance with the sort of mills they have, and with the numbers given above. The contribution towards the syndicate funds, in order to carry all this out successfully, is fixed at 3d. per box, and the penalty for disregarding or breaking any of the rules or conditions laid down is fixed at £5,000. The agreement is to be in force for one year, and at the end of that year anyone who is dissatisfied with the results is allowed to retire, and leave the others who are satisfied to carry it on, or dissolve it by mutual consent. If it is generally regarded as successful, then it will be carried on for a further term of three years. These are the main articles in one of the newest things in syndicates, and the greatest ever attempted in connection with the syndicate trade in South Wales. What success will attend such a project it is difficult to conjecture, and certainly useless prophesying about. It is one fraught with the greatest consequence to South Wales and Monmouthshire, as the manufacture of tin and terne plates is their staple industry. We may, however, add this much, that it ought to succeed, as it deserves success, and doubtless it will succeed if the tin-plate makers will be but unanimous and carry out the various provisions of the agreement in reality and with sincerity, and not let it meet the fate of many previous projects—ignominious failure, brought about by their attempts at over-reaching one another. Doubtless more will be heard of this great project on the various metal exchanges during the next few weeks. It should restore a once paying and flourishing trade to its former state of profit and prosperity.

## TIN IN AMERICA.

THERE can now be no longer any doubt that the British tin trade, so far as exports to the United States are concerned, is doomed beyond all hope of redemption. In the Black Hills of Dakota tin of superlative quality is now being found, and the supply is apparently inexhaustible. The early doubts and difficulties in the way of a home tin trade have been surmounted, and at the moment of writing works of gigantic extent, backed by the capital of a prince, are in full and active operation. The effect of this upon the tin-plate trade of South Wales your own manufacturers will be able to gauge without much difficulty. They will contemplate the prospect that is now opening out before us with dismay. As Lord Thurlow pointed out in the London *Financial News* recently:—"America will quarry its own tin-stone out of the Dakota hillsides, will smelt its own ores, will roll its own tin plates, and will put a prohibitory duty on the import of foreign tin in pursuance of its invariable policy of fostering its own industries. These things are now inevitable, and will happen as surely as night follows day; and no amount of whining or lamentation from Cornwall or elsewhere can stop the, perhaps gradual, development of the American tin industry." The discovery of tin in immense quantities in this country, as Lord Thurlow has very frankly said, "represents the dawn of a new era that cannot fail to be most unwelcome to the favoured and very narrow circle that has hitherto handled the tin trade of the world." Of course, all this won't come about in a day or two. There is much yet to be done before the American tin trade will influence the English market.

All know that the age of bronze preceded the iron age, and that tin is the magic metal which made bronze a possibility, and most know that the world's present supply of tin comes through England, which controls not only the great Cornwall tin mines—from which the Phœnicians and Romans got tin more than two thousand years ago—but those of the Straits of Malacca and Australia. The small amount of tin which is drawn from Bohemia, Saxony, Spain, and Peru does not deserve to be taken into consideration; but we find that of the 40,000 tons or so of tin which constitute the world's output of this metal, the Malacca district produces rather more than half, and Australia and England nearly one-fourth each. Of these 40,000 tons or so the United States consumes at least one-half, and the amount paid by us for imported block and grain tin runs about $5,000,000, and for sheet plates, etc., between $17,000,000 and $18,000,000. While there is no duty on pig or block tin, that on rolled or plate tin is one cent per pound. Not only does all the tin of the world come from three districts, but it has been for some time in the hands of a syndicate which has rapidly advanced the price by controlling the entire output. The French Tin Syndicate, with a capital of $50,000,000, last April bought all the tin then on the markets of the world, and options on all to be produced for two years, and at once commenced raising the price. Prior to that time the price of tin varied from 16 to 23 cents per pound, but early in 1887 it rose 50 per cent., and it is now about 35 cents per pound, with a fair prospect that it will go much higher. In prospect of such increase of price, the purchases of tin in this country have largely increased. While the tin mines of Cornwall have been worked for hundreds of years, and are now down under the sea at a distance of 3,000 feet from the surface, and while the expense of lifting the 2 per cent. ore and pumping water from such a depth, even with all the aid of modern machinery, must be enormous, we have the 3 per cent. cassiterite of the Black Hills near the surface, upon lofty and rugged mountains. There can, of course, be no comparison of the expenses of working these two classes of ores under such widely different circumstances.

The discovery of tin in Dakota is no new thing. It was first found in the Black Hills in 1883, although its presence was known much earlier, and had been suspected for many years. From time to time since 1883 experiments have been made by metallurgists and others, and a good deal of capital has been sunk. It seemed for some time that little would come of it all, and as the original boom died away there were not wanting those who were ready enough to affirm that there was "nothing in it." It remains to be seen whether, in the altered circumstances, they will adhere to this opinion, or prepare to meet with competition from Americans in the American market. It is notorious that the United States takes an enormous proportion of the tin plates manufactured in South Wales, and anything calculated to diminish the demand from that quarter will have a most prejudicial influence on the industrial life of South Wales.

But there certainly is no longer any room for either ridicule or scepticism. The tin is there, and there in tremendous quantities; and the men are there, too, who will work it. As a matter of fact, the amount of tin in the Black Hills deposits is not only amply sufficient to render the United States practically independent of foreign sources of supply, but the metal itself is of equal quality to any now imported. While the yield at Altenberg, in Saxony, is from ½ to 1 per cent., and that of block tin for the whole country is less than 2 per cent., and while, further, in the Palberro district of Cornwall the average of all ore crushed in five years was but ·89 of 1 per cent. (the mines yielding a fair profit at that), the assays made by Prof. Carpenter, of the Columbia College School of Mines, of the Dakota ores, show (many samples running as high as 60 per cent.) an average of 3 per cent. of block tin, thus far exceeding that of Cornwall, which is by Government report 1·95 per cent, while the yield of the Zwitter, in Zinwald, according to Bruno Keri, is only about ½ per cent. Commercial men here in New York do not hesitate to say that the American tin trade has a tremendous future before it.

## CITY MANURE AND INFECTION.

DR. DAVID PRIDE, Neilston, read a paper before the Glasgow Philosophical Society last week, on "The Spread of Enteric Fever, and possibly Diphtheria, in Rural Districts by the Use of City Manure for Agricultural Purposes." He related a number of cases of enteric fever which had occurred in his neighbourhood, a hilly and healthy district within the last year or two, and attributed them to enteric germs conveyed from the city in manure spread on the hill-slopes, from which the water used by the

patients was collected. He argued also that there was a strong probability of diphtheric germs being carried by the same means. He suggested the destruction of city manure in charring furnaces, under the control of the Cleansing Department of the city.

In the discussion which followed, Dr. Eben. Duncan cited similar cases to those instanced by Dr. Pride, and expressed the hope that the accumulation of facts would lead to the authorities taking steps for the prevention of the spread of disease in this manner. He submitted that there should be disinfection of the manure, and that the spread of organic manure on the gathering grounds of water supply should be prohibited.

[This theory should not be accepted without a very critical examination and positive proof. Prevention is, no doubt, better than cure, but people in "hilly and healthy" districts generally drink water from a well situate only a few yards from their cesspool. We could furnish ample proof of this.—Ed. *C. T. J.*]

## HYDROGEN PEROXIDE AS A MEANS OF BLEACHING WOOD.

THE bleach bath is prepared by mixing 10 litres of hydrogen peroxide with 200 grammes of spirits of ammonia of 0·910 specific gravity, and the wood to be bleached, whether in the form of planks or of ornaments, plunged into the same and densely packed together. Temperature about 17 to 20° Celsius. Every ten hours 50 grammes of spirits of ammonia should be added, and intimately mixed with the contents of the bath.

After a lapse of three to five days the process of bleaching is finished, after which the wood is slowly dried at a low temperature.

In addition to the white colour a high power of resonance is imparted to the wood, inasmuch as all the colouring and extractive elements stored in the cells are removed by the process of bleaching, and consequently the wood becomes admirably adapted for being treated with oils, paints, and varnishes.

# Queries and Replies.

C. $S_2$.—What quantity of bisulphide of carbon can be practically made per ton of sulphur, and what are the means employed to recover the sulphur from the uncondensible sulphur compounds which escape during the process of its manufacture?—R. H. S.

[We insert this query of a correspondent, but with the hope that he will not be disappointed if he does not receive a reply.—Ed. *C. T. J.*]

Smoke Nuisance.—Can any of your readers refer me to any good treatise detailing trustworthy experiments upon the prevention of smoke, in actual practice, by the use of gaseous fuel, and the cost of same as compared with coal?—Millowner.

Natural Gas.—Is there any work published on the natural gas of the United States, with illustrations of the burners actually used on an industrial scale?—B. J. H.

Mensuration.—Will some of your readers kindly give the formulæ for calculating the cubical capacity of "boat-pans" and of "cones," such as are used for crystallising? Tyro.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

R. H. S.—Your query has been inserted, but we think you have asked for rather too much.

J. A. Walker.—Thanks for your note and sample. We have examined the concrete, and will say a few words thereon in a future number.

B. B. J.—Yes, over one hundred thousand tons annually. About 5 per cent. per annum.

Sail Maker.—It is wood-tar, not coal-tar.

T. B.—See our article in this week's issue.

Furnaceman.—There is a loss of heat by the operation; still both products can be dealt with so much more economically, separately, that there is ultimate economy.

F. H. W.—An inch of rain is roughly one hundred tons to the acre, or just over four and a half gallons to the square yard.

H. C.—The rainfall is still much below the average.

B. B. T.—Next week.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—I am sure all the Fellows of the Institute ought to be very grateful to you for having published such a good account of the annual meeting lately held in London; but it does not seem from that report that some of the principal actors have come very well out of the fray. In fact, I, myself, know very well that some country Fellows simply filled up the ballot list in favour of the Council because they did not believe in the *bona fides* of some of the agitators. In fact I did so myself, while others did not vote at all for very similar reasons.

I think, sir, I am doing some good by calling the attention of the Council, if any of that august body ever read the pages of the *Chemical Trade Journal*, to the fact that the majority in favour of the house list was not due to a very widespread wish to support the Council, but was due to the very clumsy way in which the opposition went about their work. In the hands of a good organiser I verily believe the result would have been disastrous to the Council in spite of the urgent whip amongst the London members. It would be a very great pity to allow any ill-feeling to exist between any section of town and country members, and I therefore hope the Council will minutely consider what steps can be taken to make us one harmonious whole.

Regarding the qualification for membership, I do not see why anyone should be admitted into the Institute without examination, but I do also hope the Council will not be so foolish as to prescribe a course of study at certain schools, colleges, or universities. It should not matter to an examiner where a candidate obtained his knowledge so long as he has it. I am the more convinced of this when I remember the fact that the great majority of all men who have excelled either in science, literature, or art have been self-taught men, and why should chemistry commence a retrograde movement by refusing entry to such earnest students. Is it not a fact that some of the recent agitators make the best part of their living by the students passed through their laboratories, and surely the Council will not agree to take three years of bottle-washing as being equivalent to one examination.—I am, etc. H. H.

## WIDNES.

IN an article on the Ship Canal Works, which appeared in the *Daily News*, the following reference is made to Widnes, which beats Matthew Arnold's description of St. Helens as a "Hell Hole:"—Widnes is the dirtiest, ugliest, most depressing town in England. The smoke of its "chemicals" ascends for ever and ever. From its innumerable shafts of dingy red-brick pour out volumes of glaring white steam, or of coal smoke, that gradually melt away into the brown-black canopy which blots out the sky, and through which a fragment of sun appears like a rag of sickly pale yellow orange peel. That bilious sun reminds me of many a face I have just past in those horrible streets of Widnes. The yellow Widnes face is the result of the alkaline and other exhalations which, in the bleaching-powder factories, are so dangerous to life, and otherwise so vile, that no workman must face them without a thick cloth "muzzle" over his nose and mouth, and even then for only a few minutes at a time. The street atmosphere of Widnes being a confusion of competing stenches, the marvel is that anybody escapes without a yellow face. Runcorn is the ditto of Widnes—only less. When the wind blows from the north-west, Widnes pours its poisonous smoke into Runcorn. When it blows from the south-east, Runcorn returns the compliment. When there's no wind at all, they enter into a criminal plot to choke up the fair vault of heaven—as they are doing to-day, while between their greasy, leprous-yellow foreshores flows the Mersey, like turbid oil, with sinuous streaks of scum on its surface. The sea-gulls have become so demoralised that they may be seen wheeling about in the smoke of Birkenhead, and their shrill cry heard amidst the din of steam pipes. But surely no fish can be so devoid of all sense

of decency, and so lost to self-respect, as to venture in that stream of sewage. But though the details are mean and repulsive, the whole prospect—the vague glimmer of the Mersey, vanishing, remotely, in mist; the haze and smoke hanging like curtains over dimly indicated or unseen towns, from Warrington and Latchford eastwards to Garston, towards Liverpool, in the west—all this has the grandeur and fascination at any rate of vastness, and even monotony, as with the monotony of the desert. "And we are a healthy population." This was said by a Widnesite with a face as yellow as a guinea. "Healthy; how so?" "We seldom have fevers, or smallpox; the cases we do have are imported; and that's because the acid fumes kill all the germs." On the way to Warrington there is a space where all the trees have been cut down. Their stumps, still white and fresh, exhale a sweet scent, to which I piously and unaffectedly say grace—after the vitriolic stench of ugly Widnes. . . . What an affecting sight for the Ship Canal navvies to witness this æsthetic newspaper correspondent, who does not believe in the cleansing properties of fire and brimstone, falling down to worship in proper pantheistic posture the broken stumps of an old tree, giving off its turpentine and tar exhalations by the piny woods of Daresbury.

## THE UNITED STATES TARIFF.

THE United States Treasury returns show that there were collected last year the following sums on the articles mentioned, which come properly under the head of raw materials of American industries and food supplies:—

| | Dollars. |
|---|---|
| Beeswax, borax, barytes (crude) | 1,912 |
| Breadstuffs, grain, flour, meal, etc. | 1,042,404 |
| Bulbs and bulbous roots | 25,314 |
| Bristles for making brushes | 149,982 |
| Cement—Portland, Roman, for building purposes and the like. | 146,659 |
| China clay and other unwrought clays and earths, for pottery making | 60,261 |
| Chicory, a substitute for coffee | 80,922 |
| Chromate of iron and chromic ore, used in making paints, bichromates, etc. | 6,550 |
| Coal | 581,000 |
| Coal-tar dyes | 522,686 |
| Coal, slack, and culm | 13,540 |
| Coal-tar products, for making dyes and colours | 17,239 |
| Copper ore | 168,096 |
| Copper, unmanufactured | 7,772 |
| Currants, Zante | 226,350 |
| Egg yolks, used in leather manufacture | 2,500 |
| Crude feathers, for various uses | 238,874 |
| Garden seeds | 42,582 |
| Crude glycerine, for making explosives | 158,415 |
| Flax and hemp | 80,020 |
| Greases and oils, for soap making, etc. | 18,162 |
| Hay | 184,351 |
| Hemp | 194,136 |
| Hops | 217,917 |
| Iron ore | 525,193 |
| Jute | 393,788 |
| Honey | 16,264 |
| Human hair (raw) uncleaned | 11,733 |
| Live animals | 722,695 |
| Lumber | 867,849 |
| Manilla | 626,895 |
| Marble | 229,872 |
| Meat, game, and poultry | 11,503 |
| Mineral substances in a crude state | 6,814 |
| Mineral waters | 5,072 |
| Potash | 104,716 |
| Potash, carbonate and sulphate of, and caustic | 48,975 |
| Pulp of straw, for paper makers' use | 28,005 |
| Quicksilver | 14,282 |
| Sisal grass | 493,751 |
| Salt | 706,324 |
| Soda | 1,448,263 |
| Sponges, from the Mediterranean | 59,768 |
| Stone in the rough, sand, etc., for building | 15,109 |
| Tallow and pitch | 185 |
| Timber, hubs for wheels, posts, laths, last blocks, etc., staves, pickets, clapboards, etc., in the rough and other unmanufactured wood | 104,267 |
| Wool | 5,126,108 |
| Woollen and other rags, shoddy, waste, etc. | 269,693 |
| Zinc | 88,000 |
| Total | $16,053,658 |

Here is a reduction of over $16,000,000 if the committee should adopt this free list entire. They may not find it possible to do so; and they may add some other articles to it, such as tin-plate, which ought to go on the free list, as it is the raw material of one of the largest purely American industries, that of canning fruits, vegetables, and meats. But whatever changes are made from the above list, it can be said that the committee will insist on free wool. They are encouraged to this by numerous letters from woollen manufacturers which they are receiving, most of which are private, the writers desiring not to be openly known as favouring free wool. It is probable now that the influence of woollen manufacturers will secure the bill six or eight additional votes in the House.

## PROMOTORS' BALANCE SHEETS.

A CORRESPONDENT of the *Times* writes to that newspaper under the *nom de plume* of "Argus," as follows:—

Sir,—In confirmation of what you recently stated in a leading article in the *Times*, as to the numerous and varied deceptions by which promoters of limited liability companies so often succeed in entrapping the credulous public into their toils, like flies entangled in spiders' webs, I wish to add a few words on the subject of the bogus balance-sheets which are usually issued when these schemes are offered to public subscription for shares. The bulk of commercial businesses are worth from two to five years' purchase, at which latter rate the business of the celebrated bank of Messrs. Jones, Lloyd, and Co. was sold to the London and Westminster Bank; but three years' purchase is the real value of most businesses, and those of a stockbroker and of a medical practitioner are worth much less, the latter usually only realising from one to one and a half year's purchase of the net profits. In almost all cases where businesses have been formed into limited liability companies the purchase price to the shareholders has been about ten years' purchase, or more than three times the real value, and in most cases no deduction is made for the directors' fees, management, bad debts, and other necessary expenses. A business bought at ten years' purchase to a careless and superficial observer appears to yield 10 per cent.; and to add to the attractiveness of the bait, half the capital is usually issued in debentures yielding 6 or 7 per cent.; so that if the net profits were really 10 per cent., then, by the profit on the debenture shares of 4 or 3 per cent., the return to the shareholders would be 14 or 13 per cent., which is a very alluring prospect to ignorant investors, who can obtain only 3 per cent. on the best securities and about 2¾ per cent. in the funds. As first-class new built office and shop property can be bought in the best parts of the City of London, with leases of eighty years to run, to pay 7 per cent., how can goodwills be worth a price to pay only 10 per cent., with all the risks of custom falling off, etc.? The result of the operations of such a company for a very short time is that the shareholders cease to receive any dividend, and that the debenture holders, who are usually the promoters, and their accomplices, squeeze out the shareholders and become possessed of the whole concern.

The foregoing statement is based on the supposition that the calculation of the net profit for an average of, say, three years is correct, but in the large majority of cases it is utterly illusory and fraudulent.

In the first place the accountants who estimate the net profit do not, I believe, generally examine the vouchers, but take the entries in the books, which are usually cooked, just as they find them, and above all they do not value the debts due to the firm, some of which are doubtful and others utterly irrecoverable, but take them all as good, unless, perhaps, the debtors are notorious bankrupts. In fact, in retail businesses, where unlimited credit is given to persons who are chiefly, non-traders, it is impossible to estimate accurately the value of book debts, as we constantly see in the newspapers the bankruptcy of individuals whom every one thought not only solvent, but even rich, and whose estates sometimes yield nothing to unsecured creditors, such as shopkeepers.

About the worst form of roguery connected with the transformation of a chrysalis business into a butterfly company is the following:—A retail commercial business produces, say £5,000 a year net profit, supposing that nothing is deducted for the skill and labour of the partners, and that all book debts, excepting those due by bankrupts, are valued at 20s. in the pound, but the partners, seeing by the success of Co-operative Stores and otherwise, that their enormous profits are steadily decreasing, and their good customers falling off, while their bad customers are increasing, resolve to form the concern into a limited liability company. They then determine to "rig" their apparent profits so as to bring them up to, say £10,000 a year, which at ten years' purchase would suffice for a company of sufficient importance (£100,000) to attract the public and obtain a quotation on the Stock Exchange list.

They then secure the services of a confederate who has some capital or credit, and for three years this confederate purchases through himself or his nominees such an amount of goods as would yield a net profit of £5,000 in each of three years. Suppose the profits on the concern are 30 per cent., which is quite common in many businesses, as, for instance, in that of a bookseller, who receives more than 33 per cent., and who, in the case of the discount bookseller, allows 25 per cent. to the public, while the full-priced bookseller allows nothing. Then the "bogus" business which has to be transacted by the confederate would amount to somewhat less than £17,000, and supposing him to resell his purchases at the wholesale price, or 30 per cent. discount, a capital sum of £15,000 would meet this lock-up of capital for the three years, and this is simply lending the firm that sum for that time. In case this course is adopted it is impossible by cross-examination in a court to detect the plot, as the confederate's banker's books and his own books will show that the purchases were made and paid for in cash, and no one has a right to ask when, how, and for how much he resold the goods.

The plan, however, can be worked without funds, as the owners of the business have only to hand the requisite amount of goods from time to time to their confederate, who then sells them at less than the wholesale price, and he can then repay in instalments from the proceeds of such sales and from money which the partners of the firm can give him from time to time out of the double profits which they appear to make, which enables them to make double drawings from their bankers after passing these "bogus" dealings through their books and bankers. When the company is brought out, the real value of which at most is £15,000 for three years' purchase of the net profits for the goodwill independently of the stock, the price of the goodwill is fixed at £100,000, or ten years' purchase of the £10,000 a year net profit appearing in the books. Consequently, if the shares are placed, the public is defrauded of £85,000, and the original firm with its confederate and other promoters share the plunder.

In some cases 10 per cent. or even more is given for placing the shares and to induce members of the Stock Exchange to rig" the market to one or two premium.

Anyone who has had to do with the sale of public-houses knows that a bogus trade is constantly created to secure an exorbitant and unfair price, and we see cases in the newspapers constantly where such roguery is detected, exposed and punished, but no one, as far as I know, has anticipated me in laying bare the secrets of bogus balance-sheets in prospectuses of new companies whose shares are offered for subscription.

# Trade Notes.

The Alizarine Industry.—We hear that Mr. Williamson, the energetic manager of the Manchester Alizarine works has resigned his appointment. We have also been informed that it is not the intention of the proprietors to fill up the vacancy from the outside.

Sheffield Gas.—At the last meeting of this Company, Sir F. Mappin publicly stated that Mr. J. T. Key was no longer their engineer.

Qui Capit ille Facit. — When an employé essays to build a house for himself, he should be careful from what source he obtains his raw material, and he should also carefully decide beforehand whether he or his employers should pay for the labour thereof. If he resolves on the second alternative it would be better to get their consent beforehand, otherwise it may lead to disastrous results.

Hannay's Patents Company.—A meeting of shareholders of this company was held last week, within the offices of the company, No. 67 Great Clyde-street, Glasgow, at which the report and balance-sheet were adopted. The results of the business for the year ending 31st December last show that after writing off the entire amount at the debit of patent purchase account, patent charges, development, etc., amounting to £2,289 11s. 7d.; from development of sundry patents account the total amount expended thereon—viz., £1,206 11s; from establishment of company expenses, the total balance previously carried forward, £922 6s. 11d.; and from furniture account the sum of £27, there remained a balance of £10,417 8s. 1d. at credit of revenue account. A dividend of 5 per cent. was declared, absorbing £3,047 13s. 1d. leaving a balance of £7,369 15s. to be carred forward to next year's account.

Snow and Rain.—Mr. Edward Hull, F.R.S., writes to yesterday's papers about the "effect of snow on the springs," maintaining that "snow is the very best agent for supplying the underground reservoirs of water." It remains longer on the ground than rain, he says, and says rightly; and so the process of percolation goes on slowly but steadily, the water finding its way to the fissures which lead to the springs. That is doubtless the fact. But, then, there is on the whole so little snow. Bulk for bulk of water, a foot of snow is about equal to an inch of rain.

A Submerged Forest.—During the late violent storms in the Channel the sea washed through a high and hard sandbank near St. Malo, nearly four mètres thick, laying bare a portion of an ancient forest which was already passing into the condition of coal. This forest at the beginning of our era covered an extensive tract of the coast; but with the sinking of the land it became submerged and covered up by the drifting sand. Mont Saint Michel once stood in the middle of it. The forest had quite disappeared by the middle of the tenth century. Occasionally, at very low tides after storms, remains of it are disclosed, just as at present. It is believed that some centuries ago the highest tides rose about 12 mètres above the level of the lowest ebb. Now the high-water level is 15·5 mètres above the lowest.

A New Use for Coal-Tar: The Progress of Civilisation.—A most shocking outrage has just been permitted at the parish church of Whitchurch, near Cardigan. It appears that after dark on Friday the door of the church was coated over with coal-tar, and several windows in the church were smashed. The gate of the churchyard was also taken off its hinges and thrown amongst the graves. It is believed the outrage was perpetrated by tithe agitators, who are standing out against the payment of their tithe. The majority of tithe payers throughout the parish have not paid their tithes for a period of two years.

A Prosperous Concern.—The directors' report of the Commercial Gas Company for the half-year ending December 31st last states that the net profit for the half-year amounted to £46,232, making with £413 received for interest £46,645. This, added to the amount brought forward from the previous half-year, makes £90,760. Deducting therefrom £2,727 for interest on Debenture stock, there remains standing to the credit of the net revenue account a balance of £88,032, of which, having regard to the sliding scale and the price of gas charged during the half-year, £44,800 is available. The directors recommend the payment of dividends at the rates of £13 10s. per cent. per annum upon the Old stock of the company and of £10 10s. per cent. per annum on the New stock, both less income-tax.

Nobel's Explosives Company.—The directors of Nobel's Explosives Company have issued a statement to the effect that the accounts for the year 1887 show a balance available for dividend of £63,057. They recommend that a dividend be declared at a rate of 22½ per cent., absorbing £54,000, and that £5,000 should be placed to the credit of the reserve fund, and £4,057 carried forward. The shares are almost wholly the property of the Nobel Dynamite Trust Company (Limited).

A Destructive Fluid.—Dr. Junemann, an Austrian chemist, claims to have invented a fluid of most destructive properties. This fluid when brought into contact with the air, after the explosion of a shell in which it has been contained, is transformed into a gas, which, being heavier than the air, descends to the ground, killing all the men and animals within its reach, and, moreover, destroying iron, bronze, and other metals, as well as setting all inflammable things on fire. So at least the inventor declares in a letter published in one of the Vienna newspapers, and he adds that as far back as 1848 he offered his invention to the Austrian War Office, which, however, declined both then and on a subsequent occasion to make experiments. For this reason he now gives publicity to his invention, as his patriotic feelings do not allow him to reveal his secret to foreign Governments.

The Sugar Bounties.—The French Government has forwarded to Her Majesty's Government its proposed scheme for carrying out the recommendations of the Sugar Conference which was held in London last December. France will probably be represented at the Conference to meet next week in London by the same delegates that attended the previous Congress. The French scheme makes the acceptance of the abolition of bounties dependent on many reserves. The sugar interests in Paris are closely watching the subject with a view to prevent the adoption of the system proposed, but they do not yet consider the possibility of its acceptance sufficiently probable to take any steps in the matter.

The Fury of the Chemical World.—Three things were sought by the ancient alchemist—the philosopher's stone, the elixir of life, and the universal solvent. The last of these, though long known to modern chemistry, has just been separated, but cannot be retained, simply because it attacks or destroys everything. This fury of the chemical world, says Mr. W. Mattieu Williams, is the element fluorine; it exists peacefully in company with calcium in fluor-spar and also in a few other compounds, but when isolated, as it recently has been by M. Henri Moissan, is a rabid gas that nothing can resist. It combines with all the metals, explosively with some, or if they are already combined with some other non-metallic element, it tears them from it, and takes them to itself. In uniting with sodium, potassium, calcium, magnesium, and aluminium, the metals become heated even to redness by the fervour of its embrace. Iron-filings, slightly warmed, burst into brilliant scintillations when exposed to it; manganese does the same. Even the noble metals, which even at a melting heat proudly resist the facinations of oxygen, succumb to this chemical siren at moderate temperatures. Glass is devoured at once, and water ceases to be water by contact with this gas, which combining with its hydrogen, at the same moment forms the acrid glass-dissolving hydrofluoric acid and liberates ozone.—*Iron*.

Condy's Fluid.—Shortly after seven o'clock on Monday evening the 2nd inst., an alarming occurrence, unfortunately attended with the loss of three lives, happened on the river Thames. While the large sailing barge called the *Rose* was proceeding down the river with a cargo of Condy's Fluid, she came suddenly into collision with the screw steamer *Petrel*, and sustained such serious damage that she immediately began to sink. At the time five men were on board the barge, and three of them were drowned.

The Potassium Chloride Industry.—According to the report of the sale syndicate of the potassium chloride factories at Leopoldshall and Strassfurt, the sale of potassium chloride effected by the syndicate during the past half-year amounted to 1,180,155 ctr. in value 8,083,959 mks. During the past year 2,242,879 ctr. were sold, reduced to 80 per cent., against 1,884,060 ctr. in 1886. The increase in the sale during 1887 was therefore 358,819 ctr. The quantity disposed of in Germany was 820,879 ctr., against 880,960 in 1886. The quantities exported were 181,000 ctr. to England, 175,000 ctr. to Scotland, 262,000 ctr. to France, 170,000 ctr. to Belgium and Holland, 116,000 ctr. to Italy, and 368,000 ctr. to North America. In 1886, the amounts were respectively 161,500, 73,200, 136,700, 137,000, 77,090, and 337,500 ctr. The stock of manufactured potassium chloride amounted on the 1st of January, 1888, to 191,209 ctr., on the basis of the present output of carnallite. Already 2,241,063 ctr. have been sold for the current year, so that 88,759 ctr. remain to be disposed of. As, however, a quantity of about 100,000 ctr. must constantly be in stock, about 390,000 ctr. must find a purchaser if business is to be brisk.—*Kuhlow's*.

Lubrication.—In the absence of plumbago, those who are annoyed by a creaking hinge on a door may be glad to know that by rubbing the end of a common lead pencil upon the offending part it will immediately be reduced to absolute silence. Blacklead is one of the best lubricators known.—*Scientific American*.

A New Sugar Cane.—For about one hundred years most of the sugar in the West India Islands has been obtained from the Otaheite cane, originally brought from the Pacific Islands by Captain Bligh in His Majesty's ships in 1796. Latterly strenuous efforts have been made to introduce new canes in the hope that they would prove richer in yield of sugar. In one instance we learn that a cane introduced by the present Assistant-Director of Kew Gardens when in charge of the Botanical Gardens at Jamaica has supplanted the Otaheite cane and proved most productive. A planter at St. Kitts says the new cane, which he has called the Jamaican, is a "marvellous cane." He adds that "it stands dry weather well, and is entirely superseding the Otaheite cane."

The Progress of Electric Lighting.—Spain must be credited with being the first nation to make it, by absolute legislation, obligatory on managers of theatres in Madrid to light those buildings by electricity, to the total exclusion of gas. Six months are allowed in which to carry out this most important reform. All dynamos, engines, and motors of any kind are to be completly isolated from the main building, and minute rules are laid down for their safe installation. The supplementary lights are to be oil lamps. Persons employed behind the scenes are prohibited from using unprotected lights.—*Engineer*.

Thermo-Dynamics.—In a recent number of the *Comptes Rendus* is a paper on thermodynamics, by M. Marcel Brillouin. The chief subjects discussed are the principle of equivalence, specific and latent heats, and the differential relations between the specific heats.

London's Coal.—The "Pitman's Pay" speaks of "All the toil and tears it gives to warm the shins of London city." If this were so in the days when it was written, when the metropolis took a limited quantity of coal, what must it be now when this year, in the first three months, 3,400,000 tons of coal have been received in the metropolis by sea and rail? This is, as far as we are aware, the largest quantity of coal received in London in any similar period; and though a driblet thereout is sent from the Thames, yet the vast consumption of the metropolis is growing greater steadily.

Foreign Sailing Arrivals in the Clyde.—The following is a summary of the number, destination, nationality, and cargoes of the sailing-ship arrivals at the Clyde for the month ending 31st March, 1888:—

| Destination. | Ves. | Tons. | Nationality. | Ves. | Tons. |
|---|---|---|---|---|---|
| Glasgow | 10 | 5,328 | British | 16 | 14,071 |
| Greenock | 23 | 20,694 | Norwegian | 10 | 6,279 |
| Bowling | 4 | 2,830 | Dutch | 2 | 2,055 |
| | | | German | 2 | 1,672 |
| | | | Austrian | 1 | 1,418 |
| | | | French | 1 | 1,024 |
| | | | Italian | 1 | 779 |
| | | | Russian | 1 | 635 |
| | | | Danish | 2 | 568 |
| | | | Swedish | 1 | 359 |
| Total | 37 | 28,852 | | 37 | 28,852 |

A Rainy Day.—In the memoir on the rainfall in the Russian Empire that has been published by the Central Physical Observatory of St. Petersburg, ·004 inch is the amount taken as representing a rainy day. That marks a mighty difference between there and here; for in England ·01 inch is the amount taken as representing a rainy day. How would the reckoning stand as regards India? At Kurrachee, the mean annual fall is only 7 inches; on the Khasia Hills, N.E. of Calcutta, it is 51 feet.

The Food and Drugs Act in London.—David Jones, 216, Columbia-road, for selling milk, to which 8 per cent. of water had been added, was fined 40s. Alfred Bunker, 18, Salisbury-street, milk adulterated to the extent of 15 per cent., £3; Frederick Pears, 84, St. John's-road, for selling mustard adulterated with 40 per cent of wheaten flour and a small quantity of turmeric, was fined £4; James Jackson, 7, Coronet-street, for selling milk adulterated with water to the extent of 20 per cent., fined £15, after two previous convictions; and Richard Wright, 19, Scrutton-street, for selling coffee adulterated with 25 per cent. of chicory, was fined £3.

Substitutes for Copper.—The *Statist* has an article on copper, dealing with the subject from a point of view which we have not elsewhere seen gone into exhaustively. It examines whether it is possible to curtail the use of copper, and its conclusion is that substitutes can be used on a very large scale. For instance, the brass and copper used on a locomotive engine have hitherto been about 6½ tons, but by substituting iron and steel in various parts of the engine, 4½ tons of copper out of the 6½ tons at present generally used can be replaced. A large quantity of copper is also used in the brass furniture and fittings of houses, ships, carriages, etc., and here again economies in the consumption of the high-priced metal is practicable.

The Fall in the Russian Rouble.—The Russian paper rouble is now quoted at the lowest rate ever recorded, being exchangeable at 1s. 7½d., instead of the 3s. 3d. it was once worth. On the Berlin Bourse there were important sales of Russian stocks and paper roubles, which in turn affected the Vienna Bourse. Russian stock of 1873 fell on the Stock Exchange here to 90½, but closed firmer at 90¾. Rumours of failures in St. Petersburg were current in Berlin.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

[GLASGOW, Tuesday.

In the heavier chemicals there is no change to report, and dulness continues to bear rather hard on the makers, whose stocks are in certain cases inconveniently large. Sulphate of ammonia is about the only article showing any decided signs of improvement, and for it to-day as high as from £12

to £12. 2s. 6d. may be done, that is to say on conditions of quite early delivery. The position for forward delivery is for the time quite undefined, in the total absence of any representative transaction for anything but prompt. The improvement here noted is mainly due, of course, to the late better promise of weather, coupled with the consumptive needs of this particular corner of the agricultural year. Bleaching powder also, but in a much less marked degree, has firmed in the department of local deliveries, and prices a trifle better are being got. Bichromates are again in very languid demand, both for home and foreign consumption. Paraffin chemicals are all a shade weaker, with prices nominally unchanged. General prices current are :—Soda crystals, 40s. net Tyne; alum in lumps £5, less 2½ % Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; borax, English refined, £31, and boracic acid £42, net Glasgow; caustic soda, white, 76°, £8. 5s., 70/72°, £6. 15s., 60/62°, £5. 15s., and cream 60/62°, £5. 15s., less 2½ % Liverpool; bicarbonate of soda, 5cwt. casks, £5. 15s., and 1cwt. casks £6 net Tyne; refined alkali, 48/52°, 1½d., less 2½ % for Tyne; saltcake, £1. 0s. 6d., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 12s. 6d. to £7. 15s., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda 3½d., less 5 % and 6 % to Scotch and English buyers respectively; nitrate of soda, 10s. 4½d.; chlorate of potash 5¾d., less 5 % any port; sulphate of ammonia, £12 to £12. 2s. 6d. f.o.b. Leith; sulphate of copper, £22; paraffin scale, hard, 2 1/16d., soft 2d.; paraffin wax, 120° semi-refined, 2 1/16d.; paraffin spirit, 5d.; burning oil, 5¾d. to 6d.; lubricating oil, 865°, £5 to £5. 5s., 885°, £6. 5s. to £6. 15s., and 890/95°, £7. 10s. to £7. 15s. West coast imports have included 10,237 tons iron ore, 3,569 bags chrome ore, 3,362 tons pyrites of copper, and 1,180 tons limestone. Greenock: Sugar, 6,327 bags and 13,365 baskets.

## THE LIVERPOOL MINERAL MARKET.

There is little change to report in the market this week, prices remaining steady. Manganese: Although arrivals have been small there is no alteration to report. Magnesite (containing 98 per cent. of carbonate of magnesia) without alteration at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand) continues in good demand at full prices—20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals continue small, and prices are firmer—85s. to 90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) in fair demand, and brings full prices. Selected crystal lump is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone in demand; ground, at £6. 10s. to £7; specially selected lump, finest quality, £90 to £10. 10s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone is in fair demand at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore in fair demand and prices are firm, with a probability of an increase. Antimony ore firmer; £16 to £22 for fair quality. Antimony metal from £50. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12.; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferro-manganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50. China clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn).

## THE LIVERPOOL COLOUR MARKET.

Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50 to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s,; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermillionette, 10d. per lb.

## LIVERPOOL CHEMICAL MARKET.

There is practically no change to report this week. Soda-ash, 1d. up. Caustic soda: 60 % white, £5. 17s. 6d.; 60 % cream, £5. 16s, 3d.; 70 % white, £6. 17s. 6d.; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of Soda: There is little improvement at 9s. 6d. to 10s. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 5s. to £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 21s. to 21s. 6d. Bichromate of potash, 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £11 to £11. 5s. Lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic), strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Zinc chloride (solid), £18.

## MISCELLANEOUS CHEMICAL MARKET.

There is little or no improvement in the tone of business generally speaking. Concessions in price can as a rule be obtained upon any business for spot delivery, except in those cases where production and prices are already at the lowest ebb. Bleaching powder is well maintained, and £7. 7s. 6d. to £7. 10s., rails, is nearest value. Chlorate of potash is selling at 5¾d. Sulphate of copper is now quoted by makers £21 to £21. 5s. Lead acetates and nitrate are still quiet, but prices are maintained on the whole. Litharge is firm for future delivery, but some slight concessions have been made upon spot sales. Ammonia and salts are quiet. Sulphate, muriate, and carbonate are the shade weaker in prices. Acetates of lime are in rather better demand. Chloride of zinc is moving freely. Sulphate is quiet. Tin and tin crystals have a weaker tendency. Sulphur in all qualities is meeting with fair demand. Nitrate of soda, on the spot, at 10s. to 10s. 3d. per cwt., commands ready sale.

## THE ALKALI TRADE.

Prices are said to be at a standstill. Sodas are not lower, but in face of large stocks there seems no probability of an advance. Bleaching powder is fairly firm, especially for hardwood, and the demand good, but it is a question whether more is not being produced than is actually required.

The Chance sulphur recovery process has had its fête; there is now a calm after the storm, and the bulk of the trade are resting on their oars, waiting to see what they shall see. The check seems to have been due to the favourable reports of the Parnell-Simpson process.

The building of the Weaver Hall ammonia-soda works has, we hear, actually commenced, and we have no doubt that under good management the shareholders will not regret having found the needful for the starting of the concern.

## THE TAR PRODUCTS MARKET.

Benzol is much weaker than it was at this time last week, and 90's could be bought to-day at 3s. 1d. f.o.b. Goole. On the other hand, 50/90's is fairly firm, owing to the good demand for toluol, and 2s. 7d. to 2s. 8d. has been asked and paid. Solvent naphtha is in good demand at old rates, while carbolic acid (crude) and anthracene remain as firm as ever. Pitch is moving off well, but prices are practically unchanged.

Several tar contracts have been let during the week, all at exceedingly good prices. Out of thirteen tenders Messrs. Lewis Demuth have secured the Birmingham production, and Messrs. Hardman and Company that from Macclesfield and Stockport. The Bury tar, we hear, has gone to Mr. Hamor Lockwood. The prices of these contracts have not yet transpired, but it is rumoured to be at least equal to what was paid for Manchester.

## THE SULPHATE OF AMMONIA MARKET.

Prices have mended during the past week, and Beckton has been advanced to £12. 5s., but at this price there are no buyers. Business has been done at Hull at £12. 1s. 3d., but nearly all makers now ask £12. 2s. 6d. for early delivery. At Leith the present price may now be taken as £12. 2s. 6d., less 3½ %, but there is very little doing except for prompt shipment. In London outside makes considerable business has been done at £12. 3s. 9d., but now makers are asking £12. 5s. for early delivery. Many well informed makers do not expect a further rise of any extent, as the season is getting late, and there has been a steady exportation to the Continent since the turn of the year.

Several "water" contracts have been let during the past week, and the high prices which have been paid seem to point to the fact that some makers must be pinning their faith to higher prices. We hear Macclesfield water has reached 14s. at the works.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

[illegible] & S. Hepworth, Lindley, Huddersfield, mineral water manufacturers.

[illegible]son & Callis, Mexborough, brick, tile, and pipe manufacturers.

[illegible] & Trestrail, Freemantle, Southampton, mineral water manufacturers.

[illegible]ley, Heath, & Co., Burslem, earthenware manufacturers, as far as regards W. Boulton.

[illegible] & Leadbetter, High Wycombe, brewers, maltsters, and aerated water manufacturers.

W. & R. W. Cutter, Ashby-de-la-Zouch, mineral water manufacturers.

[illegible]ard & E. Massey, Nottingham, engineers, ironfounders, and boiler makers.

[illegible]. Reed & H. Sanderson, Bedlington, Northumberland, paper manufacturers, under the firm of the Blyth Paper Company.

[illegible] & Son, Rochdale, mineral water manufacturers.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

[illegible], Leonard Morse, Bridge House Hotel, London Bridge, late of [illegible]-lane Oil Works, Galley Wall Road, Bermondsey, and Bushey [illegible] Road, Camberwell, London, late oil manufacturer.

[illegible]ment John (trading as John Broadbent & Co.), Hyde, Cheshire, [illegible] manufacturer.

[illegible] Thomas (trading as J. Exley and Son), late of Horsforth, near [illegible], now of Pudsey, near Leeds, late tanner.

#### Adjudications.

[illegible], William, Wimborne, Dorsetshire, manager of gasworks.

#### First Meetings and Public Examinations.

[illegible]bert, Edmund Christian, Chalk Farm-road, oilman. First [illegible], April 17, 33, Carey-street, Lincoln's-inn; public examination, [illegible] 24, Lincoln's-inn-fields.

Buckwell, Thomas Douglas, late of Great Castle-stre[illegible] street, London, trading with E. L. Cleaver, now of [illegible] Sussex, late manufacturing chemist and druggist, now out [illegible] April 18, Official Receiver's office, Brighton; April 26, C[illegible] Brighton.

#### Notices of Dividends.

Blake, James, Manchester and Newton Heath, boiler and [illegible] maker. First dividend of 1s. 8d., April 24, 37, Brown-s[illegible] chester.

# New Companies.

Anglo-Chilian Nitrate and Railway Company Limite[illegible] £500,000 in £10 shares.

Armstrong's Patent Glass Blowing Machine Syndi[illegible] pany Limited.—Capital, £50,000 in £5 shares.

Atlas (Broken Hill) Silver Lead Mining Syndicate [illegible] Capital, £300,000 in £1 shares.

Chester's Brewery Company Limited.—Capital, £300,[illegible] shares.

East Phœnix and Dunsley Tin Mines Limited.—Capi[illegible] in £1 shares.

Fisher's Seaweed Extract Company Limited.—Capita[illegible] £1 shares.

Kempson Stopper Bottling and Brewery Company [illegible] Capital, £100,000 in £1 shares.

Navarre Copper and Silver Lead Mining Company [illegible] Capital, £65,000 in £1 shares.

Sortridge Tin Mining Company Limited.—Capital, £5[illegible] shares.

Tunbridge Wells Electric Light Company Limite[illegible] £30,000 in £5 shares.

Whitehaven Hematite Iron and Steel Company [illegible] Capital, £100,000 in £100 shares.

# The Patent List.

*The following List has been compiled expressly* [illegible] Chemical Trade Journal *by G. F. Redfern and C[illegible] Agents, 4, South Street, Finsbury, London, and at [illegible] Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Manufacture of Sodium and Potassium.** G. A. Jar[illegible] March 31.

**Carbonates, Sulphites, etc., and also Phenol or Phenolo[illegible]** W. W. Staveley. 4843. March 31.

**Compression Pumps for Gaseous Fluids.** J. K. Kilbo[illegible] March 31.

**Fire-extinguishing Apparatus.** W. Taylor. 4853. March

**Self-regulating Valve.** E. W. Donovan. 4856. March 31.

**Recording the Flow of Water and Pressure of Steam** J. F. Abraham. 4860. March 31.

**Regulating the Surface Flow of Liquids.** W. Stuart and [illegible] 4871. March 31.

**Photographic Emulsions.** E. S. Williams. 4874. March

**Improvements in the Manufacture of Gas from Coal.** [illegible] Dinsmore. 4885. March 31

**Cleaning Vegetable Fibre.** A. Figge. 4887. March 31.

**Roasting Organic Substances by Superheated Stea[illegible]** Alexander. 4890. March 31.

**Sugar Cane Mills.** H. V. R. Read. 4893. March 31.

**Treatment of Fatty Substances for Candle Making.** [illegible] Schmidt. 4899. March 31.

**Attachment to Candle Wicks to Prevent Guttering.** H[illegible] 4905. March 31.

**Polishing and Preserving Leather.** H. Dell. 4921. April

**Preserving Bakers' Yeast.** T. W. Duffy. 4927. April 3.

**Apparatus for Boiling Esparto Grass.** J. Turnbull, [illegible] April 3.

**Alternating Current Dynamo-electric Machines.** T. Pa[illegible] April 3.

**Combined Arrangement of Gas Engines and Gas [illegible]** A. Wilson. 4944. April 3.

**Process for Refining Iron.**—(Complete Specification.) G. [illegible] 4951. April 3.

**Water-gas.**—(Complete Specification.) C. Westphal. 4953.

**Improvements in Apparatus for Extraction of Amm[illegible]** Lewis. 4959. April 3.

**Apparatus for Ungumming Rhea.** J. Papleux. 4968. Ap[illegible]

**A New Beverage from Oranges.** L. Puech. 4969. April

**Apparatus for Preventing Waste of Water.**—(Complete[illegible] tion.) C. Kertsch. 4971. April 3.

**Non-intoxicating Beverages.** J. H. Kendall. 4974. April

**Manufacture of Iron.** A. M. Warner. 4975. April 3.

**Crushing or Pulverising Ores.**—(Complete Specification[illegible] Lake. 4978. April 3.

**Paraffin Lamps.** J. Duggan. 4982. April 3.

**Extinguishers for Lamps.** G. E. Dehany. 4983. April 3.

**Improvements in Presses.** E. Edwards. 4984. April 3.

**Machinery for Stamping Ores.** C. Appleby and G. E[illegible] 4986. April 3.

**Improvements in Briquettes.** R. Lindsay. 4995. April 4.

**Safety Lamps.** T. R. Weston. 5003. April 4.

**Burners to Burn Solid Paraffin and such Oils as Solidify[illegible]** Temperature. D. Ballardie. 5006. April 4.

**Self-indicating Weighing Machines.** J. Cartwright and [illegible] wright. 5009. April 4.

**Apparatus for Heating Feed-water.** J. S. McDougall. 50[illegible]

Manufacturing Gas from Molasses. J. McC. C. Paton. 5017. April 4.
Holders for Powdered Matters for Regulating the Distribution. J. T. Reeve. 5026. April 4.
Treating Pyritiferous Ores for the Extraction of Metals therefrom. J. H. Selwyn. 5031. April 4.
Stemming, Pasting, and Damping Apparatus. J. J. Allen. 5047. April 5.
Lubricators. J. T. Hailwood. 5051. April 5.
Promoting the Combustion of Gases in Furnaces. W. P. White and R. Wallbank. 5053. April 5.
Production of Dry Plates for Photography. A. Hart. 5055. April 5.
Steam Generators. J. S. McDougall. 5057. April 5.
Securing Tubes in Tube Plates. J. S. McDougall. 5058. April 5.
Revolving Furnaces for Roasting Cement. F. Radcliffe. 5062. April 5.
Lamps.—(Complete Specification.) W. Kilsby. 5063. April 5.
Force Pumps Adapted for Use with Spray Lamps. G. Rose. 5065. April 5.
Improved Apparatus for Emptying Carboys. J. Bullen. 5071. April 5.
A New Compound for the Manufacture of Bread, etc. R. Russell. 5078. April 5.
Electricity Meters. R. P. Sellon and R. C. Jackson. 5082. April 5.
Improved Apparatus for Generating Steam with Liquid Fuel. J. A. Walker. 5083. April 5.
Improvements in the Manufacture of Chromates. W. J. A. Donald. 5086. April 5.
Heating Fluids. T. J. Walker. 5088. April 5.
Bottles of Earthenware. G. J. Chambers. 5091. April 5.
Burners for Gas and Lamps. W. Cunliffe. 5092. April 5.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

## THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending April 3rd.*

**Chemicals—**

| | | |
|---|---|---|
| Penang | 20 cs. | £25 |
| Halifax | 2 ,, | 22 |
| Auckland | 14 pkg. | 57 |
| Calcutta | 40 ,, | 300 |
| Yokohama | 147 ,, | 1001 |
| Hongkong | 3 ,, | 17 |
| Brisbane | 29 ,, | 222 |
| New York | 10 cs. | 140 |

**Citric Acid—**

| | | |
|---|---|---|
| Lisbon | 10 cwt. | £82 |
| Madrid | 5 ,, | 45 |
| Copenhagen | 2 cks. | 53 |
| Hamburg | 1 ,, | 43 |
| Halifax, N.S. | 0 t. 5 c. | 46 |
| Brussels | 0 10 | 84 |
| New York | 2 10 | 436 |

**Cream Tartar—**

| | | |
|---|---|---|
| Sydney | 1 t. 0 c. | £135 |
| Brisbane | 0 26 | 202 |
| Newcastle | 0 3 | 17 |

**Chlorate of Potash—**

| | | |
|---|---|---|
| Rotterdam | 0 t. 5 c. | £14 |
| Hongkong | 1 0 | 57 |

**Disinfecting Powder—**

| | | |
|---|---|---|
| Hamburg | 5 t. 1 c. | £35 |

**Manure—**

| | | |
|---|---|---|
| Mauritius | 11 t. 7 c. | £174 |
| Penang | 98 0 | 784 |
| Jersey | 327 bags | 245 |
| Martinique | 340 t. 0 c. | 1,720 |
| Harlingden | 48 15 | 183 |
| Hamburg | 250 0 | 2,080 |
| Guadaloupe | 551 0 | 6,300 |
| Launceston | 30 0 | 128 |
| Hobart | 20 0 | 86 |

**Oxalic Acid—**

| | | |
|---|---|---|
| Boston | 20 cks. | £170 |

**Prussiate of Potash—**

| | | |
|---|---|---|
| Yokohama | 32 kegs. | £106 |

**Sulphate of Ammonia—**

| | | |
|---|---|---|
| Demerara | 49 t. 19 c. | £681 |
| Martinique | 175 0 | 2,100 |

**Salammoniac—**

| | | |
|---|---|---|
| Madras | 13 cwt. | £20 |

**Sulphate of Copper—**

| | | |
|---|---|---|
| Brisbane | 25 tons. | £540 |

**Soda Crystals—**

| | | |
|---|---|---|
| Brisbane | 5 t. 0 c. | £14 |
| Newcastle | 30 0 | 74 |
| Antwerp | 2 0 | 8 |
| Yokohama | 30 1 | 69 |

**Sulphur—**

| | | |
|---|---|---|
| Algoa Bay | 100 kegs. | £31 |
| Brisbane | 160 brls. | 128 |

**Flowers of Sulphur—**

| | | |
|---|---|---|
| E. London | 40 kegs. | £19 |

**Sulphuric Acid—**

| | | |
|---|---|---|
| Algoa Bay | 0 t. 4 c. | £44 |
| Antwerp | 4 0 | 16 |

**Tartaric Acid—**

| | | |
|---|---|---|
| Newcastle | 10 cwt. | £85 |
| Brisbane | 9 cs. | 169 |
| Halifax, N.S. | 4 cwt. | 34 |
| Auckland | 4 kegs. | 34 |

## LIVERPOOL.

*Week ending April 4th.*

**Acetic Acid—**

| | | |
|---|---|---|
| Valencia | 5 cwt. 1 qr. | £5 |

**Alkali—**

New York 70 tcs.

**Alum—**

| | | |
|---|---|---|
| Rosario | 2 t. 17 c. 0 qr. | £21 |
| Melbourne | 1 0 1 | 5 |
| New York | 17 10 0 | 97 |
| Galatz | 4 13 0 | 23 |
| Ibrail | 3 5 2 | 14 |

**Ammonia (liquor)—**

| | | |
|---|---|---|
| Antwerp | 4 c. 3 qr. | £5 |

**Arsenic—**

| | | |
|---|---|---|
| Rio de Janiero | 1 t. 3 c. 1 qr. | £14 |

**Bleaching Powder—**

| | |
|---|---|
| Baltimore | 91 cks. |
| Boston | 110 tcs. 1058 ,, |
| Genoa | 96 ,, 637 ,, |
| Ghent | 130 ,, |
| Lisbon | 10 ,, |
| Halifax | 3 ,, |
| New York | 53 tcs. |
| ,, | 22 bxs. 37 pkgs. 175 cks. |
| Rouen | 13 cks. |
| Syra | 4 kgs. |
| Venice | 14 cks. |
| Philadelphia | 57 ,, 9 bxs. |
| Piraeus | 14 ,, |
| Rotterdam | 6 ,, |

**Bicarbonate of Soda—**

| | |
|---|---|
| Bremen | 40 kgs. |
| Copenhagen | 50 ,, |
| Halifax | 130 ,, |
| Hamburg | 117 brls. |
| New York | 250 kgs. |
| Paris | 20 ,, |
| Philadelphia | 100 ,, |
| Rotterdam | 205 ,, 5 cks. |
| Rouen | 25 brls. |
| St. John, N.B. | 500 kgs. |
| San Francisco | 30 cks. |
| Santander | 30 kgs. |

**Bicarbonate of Soda.**—*Continued.*

| | |
|---|---|
| Seville | 60 kgs. |
| Sydney | 260 ,, |
| Valparaiso | 3 brls. 2 kgs. |
| Vera Cruz | 25 bags 20 ,, |
| Alexandria | 10 cks. |
| Antwerp | 20 ,, 20 brls. |
| Barcelona | 245 kgs. |
| Bombay | 60 ,, |
| Carthagena | 100 ,, |
| Charlottetown | 20 ,, |
| Genoa | 20 cks. 20 ,, |
| Ibrail | 30 ,, |
| Melbourne | 505 ,, |
| Rosario | 18 cs. |
| Trieste | 40 kgs. |

**Brimstone—**

| | | |
|---|---|---|
| New York | 16 c. 1 qr. | £25 |

**Borax—**

| | | |
|---|---|---|
| Genoa | 11 cwt. | £15 |

**Bauxite—**

| | | |
|---|---|---|
| Philadelphia | 2 ton. | £6 |

**Barytes—**

| | | |
|---|---|---|
| Piraeus | 2 t. 8 c. | £8 |
| Candia | 1 2 | 3 |

**Bichromate of Potash—**

| | | |
|---|---|---|
| Valencia | 0 t. 7 c. | £15 |
| Rouen | 5 7 | 213 |

**Benzopurpurine—**

| | | |
|---|---|---|
| Vera Cruz | 1 c. 2 qr. | £34 |

**Caustic Soda—**

| | |
|---|---|
| Algoa Bay | 5 cs. |
| Antwerp | 109 dms. |
| Bahia | 25 kgs. 45 dms. |
| Baltimore | 250 dms. |
| Barcelona | 50 cks. 240 ,, |
| Batoum | 2326 ,, |
| Bilbao | 52 ,, |
| Boca | 30 ,, |
| Boston | 1173 ,, |
| Brisbane | 20 ,, |
| Calcutta | 124 ,, |
| Carrill | 16 ,, |
| Catania | 75 ,, |
| Copenhagen | 10 ,, |
| Fiume | 5 cks. 15 ,, |
| Galatz | 150 ,, |
| Genoa | 272 ,, |
| Havre | 29 ,, |
| Hongkong | 240 kgs. |
| Ibrail | 35 dms. |
| Kobe | 350 ,, |
| Leghorn | 110 ,, |
| Lisbon | 20 ,, |
| Madeira | 4 ,, |
| Madrid | 138 ,, |
| Melbourne | 30 pkgs. 91 ,, |
| Mexico | 20 ,, |
| Monte Video | 50 ,, |
| Naples | 35 ,, |
| New York | 25 brls. 9 bxs. 499 dms. |

## CHEMICAL EXPORTS—*Continued.*

**Caustic Soda.**—*Continued.*
Odessa 140 dms.
Oporto 4 ,,
Pernambuco 125 ,,
Philadelphia 5 bxs. 80 brls. 746 dms.
Portland 50 cks. 235 dms.
Rouen 6 ,, 97 ,,
St. John, N.B. 25 ,,
San Francisco 150 ,,
Santander 30 ,,
Seville 81 ,,
Stettin 235 ,,
Syra 300 ,,
Tarragona 20 ,,
Valencia 52 ,,
Venice 46 ,,
Vera Cruz 3 ,,
Vigo 50 cs.
Alicante 20 cks.
Ancona 10 dms.
Bombay 36 ,,
Canada 20 ,,
Dantzic 5 ,,
Gothenburg 54 ,,
Marseilles 50 ,,
Matanzas 25 kegs 6 ,,
Puerto Cabello 8 ,,
Rosario 10 ,,
Terneuzen 29 ,,

**Carbonate of Soda**—
Genoa 60 brls.
New York 140 ,,
Demerara 8 ,,

**Chloride of Zinc**—
Halifax 3 cks. £19
,, 0 t. 5 c. 3 qr. 6
Rotterdam 2 11 3 55

**Carbolic Acid**—
Boston 0 t. 12 c. 0 qr. £73
,, 1 4 0 142
New York 2 10 0 303
,, 3 14 3 452
Rouen 1 2 0 136
Bombay 0 3 0 5
Marseilles 36 12 0 538

**Carbolic Powder**—
Hamburg 5 t. 11 c. £605

**Chloride of Barium**—
Oporto 2 tons. £15

**Chlorate of Potash**—
Hamburg 1 t. 4 c. £26
Oporto 0 5 14
Copenhagen 2 0 110
Shanghai 0 12 33
Oporto 1 0 56
New York 11 10 690
Naples 1 5 75
Buenos Ayres 1 10 80
Rosario 0 4 10
New York 10 0 545
Fairwater 0 10 25
Boston 2 10 150
Philadelphia 3 5 195
Boston 2 10 125

**Carbonate of Potash**—
New York 10 tons. £180

**Caustic Potash**—
New York 14 c. 1 qr. £14

**Charcoal**—
Barcelona 4 tons. £16

**Carbonate of Lead**—
Santiago de Cuba 1 cwt. £10

**Calcined Magnesia**—
San Francisco 2 c. 1 qr. £7

**Cream Tartar**—
St. John, N. B. 11cwt. £67

**Chemicals** *(otherwise undescribed)*—
Stettin 17 t. 3 c. 3 qr. £515
Hamburg 2 2 2 64
Dantzig 5 11 0 166
Havre 5 0 0 150
,, 103 18 0 780
Madrid 0 5 0 10
Vera Cruz 4 0 0 270
Bremerhaven 3 0 0 90

**Copperas**—
Madras 14 t. 0 c. £26
Syra 2 7 5

**Chrome Ore**—
Havre 7 t. 18 c. £24

**Carbonate of Ammonia**—
Marseilles 1 t. 1 c. £9

**Chloride of Calcium**—
Monte Video 4 t. 15 c. £10

**Dunging Salts**—
New York 5 t. 10c. £56

**Disinfectant**—
Halifax to Charlottetown, P.E.I. 3t. 18c. 2qr. £85

**Epsom Salts**—
Calcutta 50 kegs.
Halifax 20 cks.
St. John, N.B. 20 brls.
Valparaiso 4 cks.

**Glycerine**—
Hamburg 10 t. 0 c. 0 qr. £220
Bilbao 10 4 1 509

**Iron Oxide**—
Baltimore 2 t. 10 c. £21

**Iodine**—
Hamburg 15 cwt. £450

**Liquid Ammonia**—
Buenos Ayres 3 cwt. £11

**Magnesia**—
Portland 10 cs.

**Manure**—
Malaga 2 t. 0 c. 2 qr. £20
Madeira 11 brls. 13

**Muriate of Ammonia**—
New York 8 t. 11c. £219

**Magnesium Chloride**—
Bombay 4 t. 11 c. 2 q.
Manila 0 1 0 £15

**Nitrate of Soda**—
Mexico 9 t. 15 c. 0 qr. £105
Shanghai 5 1 3 53

**Oxalic Acid**—
Calcutta 4 cwt. £7

**Potashes**—
Genoa 0 t. 13 c. £14
Melbourne 2 18 70

**Phosphorus**—
Vera Cruz 1 c. 0 qr. £10
,, 17 3 110

**Peruvian Guano**—
Havana 400 tons £3,002

**Soda Ash**—
Alicante 6 cks.
Bahia 10 brls.
Boston 430 cks. 320 tcs. 520 bags.
Leghorn 36 brls.
Melbourne 153 ,,
Monte Video 5 ,,
New York 606 tcs. 148 cks.
Philadelphia 549 tcs. 256 cks.
Portland 70 cks.

**Soda Ash.**—*Continued.*
Rio de Janeiro 105 brls.
St. John, N.B. 20 ,,
Syra 390 ,,
Vera Cruz 10 ,,
Vigo 6 ,,
Zante 40 ,,
Alton 65 tcs.
Baltimore 464 ,,
Bari 4 cks.
Cadiz 2 ,,
Oporto 31 ,,
Santos 30 brls.

**Salt**—
Antwerp 401 tons.
Baltimore 415 ,,
Belize 40 ,,
Benin 20 ,,
Calcutta 3,750 ,,
Cameroons 192 ,,
Chicago 329 ,,
Copenhagen 850 ,,
Demerara 120 ,,
Ghent 230 ,,
Gold Coast 6 ,,
Halifax 1,292 ,,
Hamburg 300 ,,
Indianapolis 150 ,,
Kansas City 80 ,,
Kingston 10 ,,
Melbourne 15 ,,
Para 157 ,,
Pictou, N.S. 512 ,,
Rio de Janeiro 1 ,,
Rosario 10 ,,
Rotterdam 147 ,,
St. John, N.B. 1,422 ,,
Wilmington, N.C. 758 ,,
Winnebah 25 ,,
New Orleans 1,801 ,,
Old Calabar 45 ,,
St. Heliers 111 ,,

**Soda Crystals**—
Boston 420 brls.
Galatz 20 ,,
Portland 20 ,, 20 kgs.
St. John, N.B. 50 ,,
Pernambuco 210 ,,
Bombay 20 ,,
Calcutta 65 ,,
Cape Town 94 ,,

**Sulphur**—
Rouen 20 t. 12 c.

**Sulphur Ore**—
Shanghai 60 tons.

**Saltpetre**—
Pernambuco 5 t. 11 c.
Carthagena 2 10

**Sheep Wash**—
New York 2 t. 10 c.
Boston 1 5

**Silicate of Soda**—
Carthagena 30 cks.
Genoa 10 brls.
Melbourne 10 ,,
Lisbon 12 cks.
Rotterdam 10 ,,
Seville 25 ,,
Valencia 41 ,,

**Sulphate of Copper**—
Mexico 1 t. 2 c. 2 qr.
Ghent 2 10 1
St. John, N.B. 5 1 1
Malta 1 5 1
Bordeaux 35 5 0
Rouen 5 11 0
Talcahuano 1 6 3

## CHEMICAL EXPORTS—*Continued.*

**Sulphate of Ammonia—**
Valencia 10 t. 0 c. 0 q. £122
Barbadoes 25 5 0 320
Antwerp 20 0 0 240
Grand Canary 1 5 1 15
Demerara 10 10 0 135
Valencia 10 5 0 123
Teneriffe 0 17 2 11

**Salammoniac—**
Genoa 13 cwt. £23

**Sulphuret of Antimony—**
Havana 2 c. 3 qr. £6

**Soda Salt—**
Cadiz 1 t. 5 c. £7

**Sheep Dip—**
Monte Video 6 c. 3 qr. £10

**Washing Soda—**
Rouen 5 cks.

**Zinc Oxide—**
Alexandria 2 t. 11 c. £36

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## GLASGOW.

*Week ending April 7.*

**Bichromate of Potash—**
Bombay 1 ton 5 cwt. 3 qr. £51
Italy 5 9 0 227
Rouen 11 15 1 425
Marseilles 1 4 2 48
Rotterdam 5 casks. 75

**Bichromate of Soda—**
Bombay 0 ton 13 cwt. 3 qr. £21
Italy 21 10 3 643
Bordeaux 1 3 1 31
Rouen 23 8 0 600
Marseilles 1 3 0 33
Rotterdam 88 casks. 600

**Bone Dust—**
New York 2 tons 18 cwt. 1 qr. £72

**Bleaching Powder—**
Sydney 21 tons 12 cwt. 2 qr. £191

**Bichrome—**
Italy 12 tons 13 cwt. 2 qr. £429
Dunedin 0 17 0 35

**Benzol—**
Rotterdam 25 dms. £610

**Chemicals** *(otherwise undescribed)*
Boston 0 ton 4 cwt. 2 qr. £88
Lisbon 1 17 2 28

**Carbonate of Potash—**
Bombay 2 tons 6 cwt. 2 qr. £38

**Copperas—**
Sydney 35 tons. £70

**Charcoal** *(animal)*
Rouen 5 tons 17 cwt. 2 qr. £23

**Epsom Salts—**
Italy 2 tons 6 cwt. 3 qr. £24

**Muriatic Acid—**
Bombay 17 tons 4 cwt. £100

**Naphtha—**
Rouen 10 casks. £100

**Sugar of Lead** *(Brown)*
Bombay 1 ton 7 cwt. 1 qr. £27

**Sulphuric Acid—**
Bombay 87 tons 4 cwt. 2 qr. £516
Sydney 22 cs. 20

**Silicate of Soda—**
Sydney 4 tons £25

**Sulphate of Ammonia—**
Bordeaux 10 tons £120
Bilbao 200 bags. £260
Marseilles 140 tons. £1690

**Salt—**
Stavanger 100 bags. £10

**Tin Crystals—**
Lisbon 6 cwt. £33

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## HULL.

*Week ending April 3rd.*

**Alkali—**
Fiume 30 cks.
Trieste 30 ,,

**Bleaching Powder—**
Dunkirk 44 cks.
Venice 25 ,,

**Chemicals—**
Antwerp 23 cs.
Amsterdam 26 cks. 9 pks.
Bremen 26 ,, 6 ,,
Bordeaux 4 ,, 20 cs.
Bombay 266 ,,
Christiania 32 ,, 5 ,,
Copenhagen 134 ,, 1 ,, 20 pks.
Dunkirk 80 ,,
Gothenburg ... 13 ,,
Genoa 10 ,, 50 ,,
Hamburg 31 ,, 41 ,, 22 ,,
Libau 14 ,, ... 20 ,,
Marseilles 8 ,,
Messina 1 ,,
Naples 3 ,, 12 ,, 20 ,,
New York 50 ,,
Rotterdam ... 50 ,, 139 ,,
Trieste 233 ,, ... 45 ,,
Venice 68 ,,

**Caustic Soda—**
Bari 36 dms.
Fiume 104 ,,
Libau 18 ,,
Palermo 3 ,,
Trieste 27 ,, 5 cks.

**Manure—**
Antwerp 1,329 bags.
Dunkirk 1,044 ,,
Hamburg 1,328 ,,

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## TYNE.

*Week ending April 7.*

**Alkali—**
Genoa 8 tons.
Leghorn 8 ,,
Antwerp 15 ,,
Amsterdam 54 ,,
Hamburg 31 ,,
New York 50 ,,
Philadelphia 40 ,,
Bremerhaven 10 cwt.
Rotterdam 78 ,,

**Alum—**
San Francisco 20 tons.

**Arsenic—**
Genoa 2 tons.

**Bicarbonate of Soda—**
Genoa 1 tons.
Antwerp 3 ,,
Dantzig 15 cwt.
Hamburg 10 ,,
New York 16 tons.
Amsterdam 5 ,,

**Bicarbonate of Soda.—***Continued.*
Bremerhaven 2 cwt.
Rotterdam 12 ,,

**Bleaching Powder—**
Genoa 3 tons.
Antwerp 841 ,,
Dantzig 25 ,,
Malmo 14 cwt.
New York 49 tons.
San Francisco 40 ,,
Amsterdam 65 ,,
Hamburg 67 ,,
Philadelphia 94 ,,
Bremerhaven 4 ,,
Rotterdam 36 ,,
Terneuzen 81 ,,

**Barytes—**
Philadelphia 17 tons.

**Chlorate of Potash—**
Genoa 1 ton.
Palermo 15 cwt.
Antwerp 22 ,,
Malmo 7 tons.
Gothenburg 2 ,,

**Caustic Soda—**
Antwerp 5 tons.
Dantzig 29 ,,
Christiania 6 ,,
Hamburg 16 ,,
New York 35 ,,
San Francisco 34 ,,
Philadelphia 72 ,,

**Carbonate of Barium—**
Antwerp 20 tons.

**Chloride of Barium—**
New York 10 tons.

**Hyposulphite of Soda—**
Philadelphia 17 tons.

**Magnesia—**
Genoa 1 ton.
Antwerp 2 cwt.
Amsterdam 7 ,,

**Nitrate of Barium—**
Hamburg 1 ton.

**Phosphorus—**
Malmo 15 cwt.

**Soda Ash—**
Genoa 29 tons.
Gothenburg 9 ,,
Buenos Ayres 30 ,,
Odessa 5 ,,
Amsterdam 7 ,,
Hamburg 38 ,,
New York 300 ,,
Philadelphia 390 ,,
San Francisco 230 ,,

**Soda—**
Genoa 16 tons.
Leghorn 19 ,,
Antwerp 15 ,,
Dantzig 5 ,,
Karrebeksminde 13 ,,
Malmo 11 ,,
Hamburg 5 ,,
New York 175 ,,
Amsterdam 2 ,,
San Francisco 232 ,,
Bremerhaven 1 ,,
Philadelphia 460 ,,
Stavanger 10 ,,
San Francisco 138 ,,
Rotterdam 17 cwt.

**Sulphate of Soda—**
Naples 5 cwt.
Gothenburg 10 tons.

# PRICES CURRENT.

[THURSDAY, April 12, 1897.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are F.O.R. at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| [illegible] per cwt. | 0 | 9 | 0 |
| [illegible] per lb. | 0 | 0 | 6½ |
| [illegible] per cwt. | 0 | 12 | 0 |
| [illegible] per lb. | 0 | 0 | 6 |
| [illegible] „ | 0 | 0 | 4 |
| [illegible] per Tw. ... per bottle | 0 | 0 | 7 |
| [illegible] for Tw ... „ | 0 | 2 | 9 |
| [illegible] per lb. | 0 | 0 | 2½ |
| [illegible] „ | 0 | 0 | 2 |
| [illegible] „ | 0 | 0 | 3½ |
| [illegible] „ | 0 | 1 | 6 |
| [illegible] per ton | 15 | 0 | 0 |
| [illegible] 168°) „ | 3 | 10 | 0 |
| [illegible] 168°) „ | 3 | 2 | 6 |
| [illegible] oxide, 168°) „ | 3 | 2 | 6 |
| 150°) „ | 1 | 15 | 0 |
| [illegible] 130°) „ | 1 | 5 | 0 |
| [illegible] per lb. | 0 | 1 | 2½ |
| [illegible] „ | 0 | 1 | 6 |
| [illegible] per ton | 11 | 7 | 6 |
| [illegible] „ | 4 | 11 | 3 |
| [illegible] (pure) „ | 5 | 7 | 6 |
| (medium qualities) „ | 4 | 12 | 6 |
| [illegible] per lb. | 0 | 0 | 3¾ |
| [illegible] „ | 0 | 0 | 1¾ |
| [illegible] „ | 0 | 0 | 3¾ |
| [illegible] per ton | 21 | 10 | 0 |
| (sal ammoniac) per cwt. | 34/- & 32/- | | |
| [illegible] per ton. | 47 | 0 | 0 |
| (pure) „ | 71 | 10 | 0 |
| [illegible] per lb. | 0 | 0 | 11 |
| [illegible] (grey), London per ton | 12 | 5 | 0 |
| (grey), Hull „ | 12 | 2 | 6 |
| [illegible] (pure) per lb. | 0 | 0 | 9½ |
| [illegible] „ | 0 | 0 | 8½ |
| [illegible] per ton | 37 | 10 | 0 |
| [illegible] (metallic) per lb. | 0 | 1 | 1 |
| [illegible] per ton | 7 | 15 | 0 |
| [illegible] (native) „ | 5 | 0 | 0 |
| [illegible] (native levigated) „ | 3 | 0 | 0 |
| [illegible] Powder, 15 %... „ | 7 | 8 | 9 |
| [illegible] Liquor, 7 % „ | 2 | 12 | 6 |
| [illegible] of Carbon „ | 12 | 0 | 0 |
| [illegible] chloride „ | 2 | 0 | 0 |
| [illegible] (at Runcorn) in bulk „ | 16/- to 32/- | | |
| **For Dyers:** | | | |
| [illegible] (artificial), 20 % per lb. | 0 | 0 | 9 |
| [illegible] „ | 0 | 3 | 9 |
| **For Products:** | | | |
| [illegible], 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| [illegible] 90 % nominal „ ...per gallon | 0 | 3 | 4 |
| 90/99 „ „ | 0 | 2 | 6 |
| [illegible] Acid (crystallised 35°)... per lb. | 0 | 1 | 3 |
| „ (crude 60°) ...per gallon | 0 | 4 | 0 |
| [illegible] (ordinary) „ | 0 | 0 | 1½ |
| „ (filtered for Lucigen light)... „ | 0 | 0 | 2½ |
| [illegible] Naphtha, 30 % @ 120° C. „ | 0 | 1 | 3 |
| [illegible] Oils, 22° Tw. ... per ton | 1 | 17 | 6 |
| [illegible] f.o.b. Liverpool or Garston „ | 0 | 11 | 0 |
| [illegible] Naphtha, 90 %, at 160° ... per gallon | 0 | 1 | 2 |
| [illegible] Oils (crude) „ | 0 | 0 | 1¾ |
| [illegible] (Chili bars) ... per ton | 80 | 2 | 6 |
| „ Sulphate ... „ | 21 | 5 | 0 |
| „ Oxide (copper scales) „ | 75 | 0 | 0 |
| [illegible]erine (crude) „ | 35 | 0 | 0 |
| „ (distilled S.G. 1250°) „ | 80 | 0 | 0 |
| [illegible] Peroxide (bog ochre) „ | 1 | 13 | 0 |
| „ Sulphate (copperas) „ | 1 | 2 | 6 |
| „ Sulphide (antimony slag) „ | 2 | 0 | 0 |
| [illegible] (sheet) for cash „ | 15 | 5 | 0 |
| „ Litharge Flake, ex ship „ | 16 | 5 | 0 |
| „ Acetate (white) „ „ | 26 | 10 | 0 |
| „ „ (brown) „ | 22 | 5 | 0 |
| „ Carbonate (white lead) pure „ | 18 | 10 | 0 |
| „ Nitrate „ | 22 | 5 | 0 |
| [illegible], Acetate (brown) „ | 9 | 2 | 6 |
| „ (grey) „ | 13 | 10 | 0 |

| | £ | s. |
|---|---|---|
| Magnesium (ribbon and wire) ... per oz. | 0 | 2 |
| „ Chloride ... per ton | 2 | 7 |
| „ Carbonate ... per cwt. | 1 | 17 |
| „ Hydrate ... per cwt. | 0 | 10 |
| „ Sulphate (Epsom Salts) ... per ton | 2 | 10 |
| Manganese, Sulphate ... „ | 17 | 10 |
| „ Borate ... per cwt. | 2 | 2 |
| „ Ore, 70 % ... per ton | 2 | 12 |
| Methylated Spirit, 60° o.p. ...per gallon | 0 | 2 |
| Naphtha (Wood), Solvent ... „ | 0 | 4 |
| „ „ Miscible, 60° o.p. ... „ | 0 | 5 |
| **Oils:—** | | |
| Castor ... per cwt. | 1 | 3 |
| Cotton-seed ... per ton | 21 | 0 |
| Linseed ... „ | 19 | 10 |
| Lubricating, Scotch, 890°—895° ... „ | 7 | 15 |
| Petroleum, Russian ...per gallon | 0 | 0 |
| „ American ... „ | 0 | 0 |
| Potassium (metal) ... per oz. | 0 | 3 |
| „ Bichromate ... per lb. | 0 | 0 |
| „ Carbonate, 90 % ... per cwt. | 0 | 16 |
| „ Chlorate ... per lb. | 0 | 0 |
| „ Cyanide, 98 % ... „ | 0 | 1 |
| „ Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 5 |
| „ „ (Caustic Potash) 75/80 % „ | 20 | 10 |
| „ „ (Caustic Potash) 70/75 % „ | 19 | 15 |
| „ Nitrate (refined) ... per cwt. | 1 | 2 |
| „ Permanganate ... „ | 4 | 5 |
| „ Prussiate Yellow ... per lb. | 0 | 0 |
| „ Sulphate, 90 % ... per ton | 10 | 10 |
| „ Muriate, 80 % ... „ | 8 | 10 |
| Silver (metal) ... per oz. | 0 | 3 |
| „ Nitrate ... „ | 0 | 2 |
| Sodium (metal)... ... per lb. | 0 | 6 |
| „ Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 |
| „ „ (Caustic Soda-ash) 48 %... „ | 3 | 15 |
| „ „ (Carb. Soda-ash) 48 %... „ | 3 | 17 |
| „ „ (Carb. Soda-ash) 58 %... „ | 4 | 12 |
| „ „ (Soda Crystals) ... „ | 2 | 10 |
| „ „ (Crystal Carbonate) ... „ | 5 | 0 |
| „ Acetate (ex ship) ... „ | 19 | 10 |
| „ Chlorate ... per lb. | 0 | 0 |
| „ Borate (Borax) ... per ton. | 30 | 0 |
| „ Bichromate ... per lb. | 0 | 0 |
| „ Hydrate (77 % Caustic Soda)... per ton | 7 | 15 |
| „ „ (74 % Caustic Soda)... „ | 7 | 2 |
| „ „ (70 % Caustic Soda)... „ | 6 | 12 |
| „ „ (60 % Caustic Soda, white) „ | 5 | 12 |
| „ „ (60 % Caustic Soda, cream) „ | 5 | 12 |
| „ Bicarbonate ... „ | 5 | 5 |
| „ Hyposulphite ... „ | 5 | 10 |
| „ Manganate, 30/33 ... „ | 10 | 0 |
| „ Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 |
| „ Nitrite, 98% ... per ton | 28 | 0 |
| „ Phosphate... ... „ | 16 | 10 |
| „ Prussiate ... per lb. | 0 | 0 |
| „ Silicate (glass) ... per ton | 5 | 10 |
| „ „ (liquid, 100° Tw.) ... „ | 4 | 7 |
| „ Sulphate (Salt-cake)... ... „ | 1 | 1 |
| „ „ (Glauber's Salts) ... „ | 1 | 12 |
| „ Sulphide ... „ | 8 | 15 |
| „ Sulphite ... „ | 5 | 5 |
| Strontium Hydrate, 98 % ... „ | 6 | 15 |
| Sugar, Beet ... per cwt. | 0 | 14 |
| „ Cane ... „ | 0 | 16 |
| Sulphocyanide Ammonium ... per lb. | 0 | 0 |
| „ Barium ... „ | 0 | 0 |
| „ Copper, 60% ... „ | 0 | 0 |
| Sulphur (Flowers) ... per ton | 9 | 0 |
| „ (Roll Brimstone) ... „ | 5 | 15 |
| „ Brimstone: Best 3rds (L'pool). „ | 4 | 5 |
| Superphosphate of Lime (28 %) ... „ | 2 | 5 |
| Tallow ... „ | 26 | 0 |
| Tin (metal) ... „ | 158 | 0 |
| „ Crystals ... per lb. | 0 | 0 |
| Zinc (Spelter) ... per ton | 18 | 0 |
| „ Chloride (solution, 96° Tw.)... ... „ | 5 | 15 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, April 21, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application.



# AUGUST WILHELM HOFMANN:

## A SKETCH OF HIS LIFE.

BY PROFESSOR DR. EUGEN BELL.

ON the 8th April, 1888, August Wilhelm Hofmann, the celebrated professor and scientist, entered upon the seventieth year of his life. Old scholars and friends, from far and near, have combined to turn this day into an eventful one. It is true that the seriousness of the occasion prohibits the indulgence in noisy festivities, nevertheless it can be well understood that the admirers of the old chemical master will not allow this milestone of his life to be passed by without in some appropriate and worthy form giving expression to the feelings of love and esteem for him which they so sincerely entertain.

Among this number the *Chemiker Zeitung* will also not be behindhand, and thinks that no better token of esteem can be offered than by presenting to its readers a sketch of the life of this indefatigable labourer in the service of science, who has in a rare manner, as a man, succeeded in gaining the love and respect of all those who were fortunate enough to come in contact with him.

August Wilhelm Hofmann was born on the 8th April, 1818, in Giessen, where his father, the Hofkammerrath (Privy Councillor) and builder of the University, occupied a position of importance. He received his elementary education in the house of his father, then proceeding to a youths' seminary at Mehlbach. Later on he attended the Gymnasium of his native town. His development here did not appear to be sufficiently satisfactory to his father, who clearly saw that the instruction devoted almost exclusively to the study of the classical languages, should be supplemented by a careful study of modern languages. An opportunity soon presented itself of practically utilising what had been theoretically acquired in this direction, the son being permitted to accompany his father in travelling through France and Italy, for the purpose of prosecuting architectural studies. Without a doubt the impressions made upon the youth during these travels had much to do with the fact, that later in life, as is often found to be the case with most scientists, when devoting all his energies to chemical research, he frequently brought to bear upon the artistic side of the matter a mind governed by the finest sentiments.

On these travels the relation between father and son became that of an elder friend to a younger one, especially as the son during a long period had to guard the sick bed of the father in Italy, where he was suffering from a very painful malady. In the year 1836 the Alma Mater Ludoviciana received the ripened youth into its midst, although, even at that period he had not arrived at any decision as to what special study he would elect to devote himself to. It would have given the very greatest satisfaction to his father had he then embraced architecture as a profession, but this did not suit the inclinations of the son, whose preferential tendency towards the study of modern languages was disputed by the father on the score of less favourable prospects in the future. Finally, the study of jurisprudence was settled upon, to which for some time, with frequent interruption, young Hofmann applied himself, but without any brilliant results. Finally, in consequence of a fortunate combination of circumstances, this study was also abandoned and exchanged for chemistry. Just at this very time the chemical school founded by Justus Liebig was in full flower. Scholars, full of chemical ardour, flocked to the Giessen University from all parts of Europe, even from America and Asia, in order to study under the great master. Not only young beginners, but many who had been prepared in other places—even schoolmasters and university professors, who for years had themselves instructed—found themselves side by side in the small university town, which, in fact, for a time could be looked upon as the central point of chemical labours of all civilised countries.

The chemical laboratory, originally the kitchen of a barracks, was soon unable to contain the number of students. It became necessary to enlarge the working spaces, and as the addition of a wing did not even furnish sufficient accommodation, the whole was finally reconstructed. In this manner the famous Giessen Laboratory became founded, the first independent institution of its kind, which, however small and unimportant when compared with the palatial edifices which of late years have been erected in the interests of chemistry, has nevertheless served as a pattern and model for all.

The erection of this laboratory decided the future of young Hofmann, who had up to now been wavering between jurisprudence, philology, and even architecture. The very friendly relations which sprung up shortly between Liebig and the father, the famous architect of the new institute, exercised their influence upon the son. Once within the circle of the formidable powers of attraction of the great master, he found himself drawn with irresistible force towards the study of the natural sciences, with which he had become enchained by the charms of novelty, and which completely carried him away.

Jurisprudence was abandoned, the study of modern languages, still carried on with some degree of zest, was limited to a few hours of leisure, while every other available moment was dedicated to penetrating and overcoming the details of chemistry, physics and mathematics. We soon find the young man in rapid succession a diligent scholar and then a faithful assistant of Liebig, who considered him worthy of participation in his famous investigations and experiments. He soon became enabled, in a treatise in the form of a dissertation, to lay before his fellow scientists the splendid results of his own labours in investigating the volatile bases of coal-tar. This investigation, wherein he proved the presence of aniline as well as of chinoline, which at the present time form the subject material of such important industries in coal-tar, is the starting point of a whole series of other investigations which have proved so exceptionally fertile both in theory and practice. A second work, on the metamorphoses of indigo, which at that period finally settled the much-discussed question among chemists as to the substitution of chlorine for hydrogen, obtained for him the prize medal of the Pharmaceutical Society of Paris. However pleasant and instructive the position of an assistant to Liebig might have been, it could of necessity only serve as a passing, a transition stage to further progess. Thus the time for the young scientist arrived when he could no longer withstand the desire to enter upon a less dependent course of action, and to stand on his own feet, testing in his scientific course the power of his own motion. He bade farewell to his old master, intimate colleagues and friends, leaving his home in the spring of 1845 in order to establish himself as a private tutor at the Rhenish Friedrich-Wilhelm's University of Bonn. Here he lectured on Agricultural Chemistry, but at the same time prosecuting his experimental investigations in certainly a very unpretentious private laboratory.

The extraordinary impetus which chemistry, more especially in its organic sense, had received in Germany under Liebig's influence, did not long remain unnoticed in other countries, more especially in England, the home of Black, Cavendish, Priestley, Dalton, and Humphrey Davy. At that period chemical science played a very secondary part in the courses of instruction in the English Universities. Laboratories hardly existed where students could carry out experimental investigations. Even in London and Edinburgh an entry into a scientific chemical laboratory was connected with the greatest difficulty, and only possible by a heavy sacrifice of money, so that the benefits of practical instruction in chemistry only fell to the lot of a chosen and select few.

In this state of things all men of intelligence must have hailed with satisfaction the movement which in 1844 was set on foot in London under the protectorate of the late lamented Prince Albert; an association of men of importance was formed, having for its object the erection of a chemical institute for instruction on the lines of that at Giessen, at the same time expressing the intention of entrusting the direction of the same to a young chemist from Liebig's school. The committee of this association consisted of the most prominent members of the English aristocracy and world of science. The life and soul of the entire enterprise was Sir James Clarke, the private physician to Queen Victoria. He wrote to Liebig with the request to bring under his notice a few candidates for the position in question, to which Liebig responded, warmly recommending Hofmann. In consequence of this, in the summer of 1845, Hofmann was consulted as to his willingness to undertake the organisation of this institution which was about to be formed. Not being blind to the difficulties which were connected with the undertaking—bringing into operation in a foreign land an institution which was a complete novelty—Hofmann at first hesitated with regard to his answer. After an interview with Prince Albert, at Bonn, on the occasion of a visit of Queen Victoria to Germany, he soon found his apprehensions dispelled, and through the intervention of his gracious patron he received leave of absence of several years duration from the University at Bonn, in addition to his appointment. In the autumn of the same year he settled in London.

Here he entered with such zeal into the execution of his mission, that already early in November of the same year he was able to open a small laboratory in Great George-street, Hanover Square. Here there was at once proved, in the most eminently striking manner, how great was the need of an establishment of this character. Soon ardent students of all classes came streaming into the laboratory, who availed themselves in the most eager manner of the practical instruction in chemistry here offered to them, and to such an extent that the friends and patrons at the head of the undertaking saw the necessity of removing the young school to larger premises more suited to the purpose.

Owing to the willing response of kind well-wishers, the sum necessary for this purpose was soon forthcoming, and as early as the year 1846 Hofmann had the satisfaction of conducting his classes in a stately building, the Royal College of Chemistry, in Oxford-street, which was erected according to his own plans. He there created an active life of science, the pulsations of which were felt in the most distant circles. To the universal and ungrudging recognition of the benefits conferred by the new institution the fortunate circumstance has contributed, that from the very commencement Hofmann gathered around him a circle of talented scholars, who, animated by their instructor, in course of time, themselves became prominent representatives of chemical science and theory in their own native country. It will suffice here to mention such names as R. Galloway, F. A. Abel, Warren de la Rue, Edward C. Nicholson, T. H. Rowney, Frederick Field, Henry Noad, Charles Blackford Mansfield, Maule, Simpson, Crookes, Medlock, Bloxam, and Odling, in order to corroborate our assertion. Again, many German chemists have sought instruction from their countryman in a foreign land. The first to cross the Channel for this purpose, George Merck and Herrmann Bleibtreu were followed by many others, all of whom have found in Hofmann a stimulating master, a true and amiable counsellor in and promoter of their studies.

It is quite true there was at one period a time when the young undertaking was in great danger, but, nevertheless, it succeeded before all things, owing to Hofmann's personal active power, but also owing to the support of a circle of zealous friends, among whom we must specially mention Sir James Clarke, Lord Ashburton, Dr. Bence-Jones, and Warren de la Rue, the rolling ship was steered past the dangerous rocks and once more navigated in smooth water.

In the year 1853, the Chair of Chemistry, at the School of Mines, in connection with the Museum of Practical Geology, in Jermyn-street, up to then occupied by Dr. Playfair, became vacant owing to the retirement of the latter. The then director of the School of Mines, Sir Henry de la Beche, offered Hofmann the vacant post. When Hofmann communicated this offer to the council of the College, the latter took a step at which no one was more delighted than the council themselves of the Institute then under his direction. He decided, taking into consideration the fact that the purposes for which the College had originally been founded having been for the most part attained, to offer it as a free gift to the Goverment for incorporation with the School of Mines. The offer was accepted, and thus Hofmann found himself director of a National Laboratory without being under the necessity of ceasing his connection with his hitherto much valued sphere of labour.

In the year 1856, his activity was further extended in another direction. He was appointed to the post of one of the Wardens of the Mint, of which institution his friend Thomas Graham had for a long period held the position of Master.

During the time of his residence in England invitations had on various occasions been issued to Hofmann to return to his native land, with the view of filling the Chair of Chemistry at one of the German universities. In view, however, not only of the ties of friendship, but also of those of family, which had bound him to his adopted land, he was at the time disinclined to tear himself away from the position with which he had so endeared himself, even although the temptation was presented to him in so enticing a form that it was with difficulty he was able to resist it. This was in the year 1852, when Liebig removed his residence from Giessen to Munich, when Hofmann was requested by his old master, in terms of the highest recognition, to become his successor in the position where he had laboured with so much success and fame. In the end, however, circumstances arose which rendered his return to Germany a duty.

The Prussian Government, which up to the year 1860 had paid but little attention to the claims of chemical instruction for the universities, at that time contemplated erecting a chemical laboratory at Bonn on the largest scale, and caused, after the necessary funds had been voted in the legitimate quarter, the request to be made to Hofmann to superintend the building and undertake the direction of the new institution.

This allurement of returning to the place, which saw the starting point of his own academical activity, Hofmann was not able to resist. After a journey in company with the Bonn University architect, Councillor Dieckhoff, in the course of which he visited almost all the chemical institutions of instruction then existing in Europe, he presented to the Prussian Government the plans for the new institution which, in conjunction with the famous architect mentioned, he compiled, with the utmost attention to detail, for the laboratory proposed to be erected. In the proper quarter the plans were accepted, while in a very short time afterwards there arose on the appointed site at Poppelsdorf, near Bonn, the imposing edifice which, beautiful in its exterior as well as practical in its interior, has served as a model for laboratories, not only in Germany, but also in France and England, which have been subsequently erected.

It was not, however, destined for Hofmann to make his entry within the portals of the new institute. Towards the end of 1863 Eilhard Mitscherlich died, and at the beginning of 1864 Hofmann was proposed by the philosophical faculty of the Berlin University as his successor. The Prussian Minister of Education confirmed this selection, and gave the famous chemist instructions to erect a laboratory at Berlin on the lines of the institution at Bonn. At the same time he was given the choice—a rare instance in the history of academic calls—to select either Bonn or Berlin. Hofmann cast his lot with Berlin, settling in the capital in the summer of 1865 full of the most sincere gratitude to the great metropolis of the Thames for everything that had there been done in furtherance of his scientific activity. It can be well understood that with his departure from England the bridge which had connected him with so many friends and scientific confrères in that country was by no means broken through; for all he retained a fond remembrance, while to prove in what esteem he was held in England we would only cite an autograph letter of the Prince of Wales addressed to Hofmann in 1881, in the German language, accompanied by the Albert Medal. The text of this letter is as follows:—

"24th December, 1881.

Dear Herr Professor,—It gives me the greatest pleasure, in my capacity of President of the 'Society of Arts,' in London, to inform you that I am instructed to hand you herewith the Albert Medal of the Society, awarded to you as a token of recognition of the eminent services which you have rendered in the advancement of sciences in connection with industry, of your epoch making labours in the sphere of organic chemistry, and of your very successful efforts for the furtherance of chemical instruction and investigation. I am greatly pleased to see that the governing body of the society, in presenting this medal to you, have given expression of their recognition in so forcible a manner of their high appreciation of your labours for the advancement of chemical science, not in Germany alone, but also in England, in which country you laboured for so many years.

As may perhaps be known to you, the medal was founded in memory of the presidency of the Prince Consort, my late lamented father, from the year 1842 to that of 1861, and inasmuch as he was not entirely unconnected with your call to England, it affords me all the more satisfaction to find that I am selected now to deliver to you the medal struck in his memory, after you have returned to your native land.

With the conviction that you yourself will not find it an unwelcome episode to see that your connection with English industry and science has been renewed as well as fortified in this manner, I beg to remain with the assurance of the highest esteem, yours faithfully,

ALBERT EDWARD."

The connections which Hofmann had previously had with the University of Berlin were not extensive. The reception which he received at the hands of his new colleagues was at the very outset a most cordial one, while within a very short space of time he became united with G. Rose, Dove, Poggendorff, and more especially with Gustav Magnus and Leopold Kronecker by the bonds of the most sincere friendship. Filled with a cheerful and courageous spirit, he entered his new arena of activity, an activity which in extent and comprehensiveness was not behind that which he had manifested in England. As an university master, which position is united with that of a professor at the military-surgical seminaries, he, from the very outset, found a large circle of attached hearers and ardent scholars, which became continually augmented in harmony with the growing importance of Berlin as the capital of the New German Empire. Again his position as a member of the Royal Prussian Scientific Deputation on Medicine made no small demands upon his energy. For a long period he was attached to the Imperial Patent Office, while, as an extraordinary member of the Imperial Office of Health, he placed his rich experience in public sanitary matters completely and unreservedly at the disposal of this body, indeed, all requests for advice emanating from those in an official capacity he responded to in the most unselfish manner.

Here it would be out of place were we to enter into a minute account of Hofmann's connections with private enterprises, but we cannot refrain from making a passing reference to the great service he has rendered in the formation of the "German Chemical Association," an association of scientists, consisting of thousands of members residing in every civilised country in the universe, and which holds a prominent position among institutions of a kindred character.

That a life like Hofmann's, characterised by so much restless activity, furnishes numberless testimonies of the same need hardly be specially dwelt upon on the present occasion. The labours of this investigator reach into the whole dominion of chemistry, although they have in the main been devoted to the organic portion of that science. The experienced reader will find his works published in the "Annals of Chemistry and Pharmacy," the "Monthly Report of the Berlin Academy of Sciences," as also in the "Reports of the German Chemical Association;" then again we find him contributing to the "Philosophical Transactions," and the "Journal of the Chemical Society of London," as also to "Comptes Rendus" of the Paris Academy, and other periodicals. The number of these are so great, that it would occupy too much of the space, were we to recapitulate them here, even by referring only to their titles, that the writer of the present sketch has had placed at his disposal.

Hofmann, as early as during the compilation of his inaugural dissertation, directed his attention to the investigation of the organic bases, and it remained the principal theme of his future works. As a fact, we are indebted to him for the views which we now hold with regard to the bodies referred to. While continuing the investigations he had commenced regarding aniline and its derivatives, he became led step by step to a clear view of the relation which these substances hold towards ammonia.

In this area of investigation Hofmann became associated with his friend Adolph Wurtz, and although the French chemist had forestalled him in the discovery of methylamine and ethylamine it was, on the other hand, for the German investigator to give expression to the theory of the bases of alcohol in its entire surrounding and in its most general form. Hofmann demonstrated that not only can one atom of hydrogen be replaced by alcoholic radicals but that the power of replacement extends also to the second and third atom of hydrogen. In conjunction with the primary amines the secondary and tertiary ones appeared in view, while during the course of the further development of these processes there became associated the peculiar group of the quarternary ammonia bases, the discovery of which must be looked upon as one of the greatest achievements of Hofmann. He arrived at these important results by allowing the alcoholiodide to act upon the ammonia, while by this means he furnished chemists with the means of effecting the artificial formation of an almost immeasurable series of bodies of this character. Finally, it need scarcely be mentioned that by this means the key was furnished for recognising the character of the organic bases occurring in a natural state.

The investigations which have been briefly referred to above have exercised a lasting influence upon the progress of organic chemistry, both from its theoretical as well as practical side. Iodethyl and the hydriodic-ether of the organic alcohol radicals (with which later on the bromine combinations were associated), appeared for the first time in these investigations as the means for introducing hydrocarbon radicals in place of hydrates. Substances, which up to that time had only been in the hands of very few chemists, suddenly became the most frequent means of aid in chemical investigations, and have from that time rendered incalculable services in the elucidation of the constitution of a large number of organic combinations, quite irrespective of the

fact that in the first instance they were intended for the dyeing industry on the largest scale.

Again, Hofmann's investigations on the subject of ammonia have become of paramount importance for chemistry in general. While in this body he discovered a number of combinations, similar in constitution and properties, he laid in quite an original manner the foundation for the theory of types, which later on was brought into general adoption by Gerhardt and Williamson. In Hofmann's treatises of that period we notice the typical style of authorship used for the first time. To his works upon ammonia there were added those on polyamine and the beautiful investigations regarding the bases of phosphorus, the tertiary and quarternary ones of which he examined in conjunction with his friend Cahours. Later on he discovered the primary and secondary phosphine, which he most carefully studied.

Who among the scientists of that period was not acquainted with Hofmann's "epoch-making" investigations regarding the chemistry of the dyes obtained from coal-tar?

In the fullest sense of the word the cradle for coal-tar dyes arose in the Royal College of Chemistry, while the majority of Englishmen, among them being Perkin, Nicholson, Simpson, Maule, Medlock, and others, who at a later period technically developed this branch of applied chemistry, were either pupils or assistants of Hofmann.

As early as the year 1858, during his study of the action of chloride of carbon upon aniline, he discovered the beautiful red dye, which, when produced later on by a different and more economical method, caused, under the names of magenta or fuchsine, so great a sensation. It is no wonder, therefore, that Hofmann devoted so much attention to this offspring of his. In a series of treatises which appeared during the years 1862 and 1869, he gave an exhaustive explanation of the nature of this and allied bodies. We there also find the first communications regarding a new dye which he had discovered and which, under the name of Hofmann's violet, soon became extensively used in the trade. This magnificent colour is produced by the action of iodethyl upon aniline red, and it is a very remarkable coincidence that this same body, while it enabled Hofmann to solve important theoretical questions and assisted in bringing about important scientific results, should later on become incorporated in the series of reagents, which gave so great an impetus to the development of such an immense industry.

To these works others were added upon methyl-green (in conjunction with C. Girard), on dyes obtained from naphthylamine and xylidine, upon the nature of chrysoidine and eosine; we are also indebted to him for investigations regarding guanidine, the aldehyde of formic acid on the isonitrile—Who would not use the Hofmann isonitril-reaction for the identification of the primary amine?—on the oils of mustard, on the cedriret and pittacall, while latterly the admirable treatises upon the chemical nature of various alkaloids, especially that of conüne, without our making in the foregoing enumeration any claim to having even approximately stated his productions. It is not only in the domain of organic chemistry that Hofmann has laboured; his investigations have been extended to that of mineral chemistry, as also to analytical, technical, forensic, and hygienic chemistry, always grasping his subject from all sides with a masterly hand.

Everyone who has been engaged in ascertaining the molecular quantity of chemical combinations must be acquainted with Hofmann's apparatus for determining the density of steam. A modification of the apparatus first suggested by Gay-Lussac, but only available in a limited number of cases, which by the barometer vacuum as the measuring space, by the use of the steam of fluids boiled at a high temperature for the volatilisation, and other constructive improvements, it has been found to be of almost universal applicability, while at the present time it will scarcely be absent from any laboratory.

How invaluable to those whose occupation may lead them to be instructors of chemistry and to have to introduce beginners to this science, or to those who are engaged in the study of same, are the apparatus constructed by Hofmann and used by him in the introduction to his lectures for demonstrating the relations of volume which are noticed in the formation and displacement of gaseous bodies. It would indeed be a difficult matter to invent a more appropriate means of impressing upon the mind of the student the volumetric fundamental laws. Even in this domain Hofmann is to-day prosecuting his labours still further and unremittingly, by means of fresh experiments, to facilitate the grasping by his hearers of the knowledge of the scientific fundamental truths. Everyone who attends his lectures knows that he spares no pains with regard to the success of his experiments, making the strictest demands, not only upon his assistants, but upon himself.

Apart from the regular courses, by which he prepared his pupils both in England as well as Germany for special study, he has been enabled to lecture to more distant learned circles on special matters connected with chemical science. Thus he was honoured by permission to deliver lectures upon chemical questions of the day, illustrated by elegant experiments, before the Royal Family at both Osborne and Windsor, while after his appointment at the Berlin High School, he again lectured before His Majesty the Emperor William, Her Majesty the Empress Augusta, and other members of the German Imperial household. A brilliant circle of ladies and gentlemen followed his explanations with rapt attention, whether he was speaking in the theatre of the Royal Institution in London, or at Berlin in the lecture hall of his own Institution, or at the Academy of Music, explaining specially interesting appearances in the department of chemical science, illustrating his lectures with ingeniously prepared experiments. Again, through the clearness of his expositions he was able to captivate the simple artisans who attended his Working Men's Lectures in England and to further his subjects among them. It was with special pleasure he responded to the request made to him in the year 1875 to deliver the Faraday Lecture, in connection with the investiture of the Faraday Medal, at the Royal Institution in London. He availed himself of this opportunity to present to his English friends a sketch of Liebig's life work, paying a magnificent tribute of gratitude on the same occasion to his beloved master.

On special occasions he was compelled to deliver many a lecture in view of his official position. Thus, in the year 1869, on the occasion of the foundation festival of the military-surgical educational establishments, he lectured on "Organic Chemistry in its Relations to the Teaching of Medicine;" on assuming the rectorship in the year 1880, he lectured on "The Division of the Philosophical Faculty," in which he entered with great warmth into the necessity of conserving its unity. His rectorate oration bears the title: "A century of Chemical Research under the shelter of the Hohenzollern." Later on Hofmann also treated of the older chemical history of Berlin in a festival oration entitled: "Berlin Alchemists and Berlin Chemists." Both lectures have appeared in a volume entitled: "Chemical Recollections of the Berlin Past," and which reached a second edition.

The wish that had been repeatedly expressed to him to publish his lectures in the form of a manual, Hofmann had hitherto been unable to comply with, owing to the want of the necessary leisure. On the other hand, in his "Introduction to Modern Chemistry," which first appeared in 1865 in the English language, soon afterwards being translated into other languages, and its German issue reached the sixth edition in the year 1877, a work of paramount value to all those desirous of going back to the sources from which the chemical conceptions of the present day are derived. In conjunction with Warren de la Rue and Dr. Bence-Jones, Hofmann published from 1850 to 1853 an English issue of the Liebig and Kopp Annual Reports of the Progress of Chemistry; he wrote several articles for Liebig's Hand Dictionary of Chemistry, while after the death of the latter he entered upon the editorship of the "Annalen der Chemie und Pharmacie." He published a small Handbook of Chemical Analysis (London, 1853), but this work is not so well known abroad.

That a scholar, whose scientific labours reach so variedly into the domain of technology, did not permit the opportunity to be lost of exploring it to its entire extent, needs no further corroboration. Irrespective of his labours he found special inducements in this direction in the various International Exhibitions, which since the year 1851, both in England and on the Continent, had challenged the nations to a pacific contest. At the exhibitions held in London in 1851 and 1862, in Paris in 1855 and 1867, and in Vienna in 1873, Hofmann held the office of prize adjudicator and compiler of reports. In the latter capacity he compiled the well known treatise upon Organic Chemistry as applied to perfumery, the highly valuable report upon the London Exhibition of 1862, and finally that on the Tar Colour Products in the Paris World's Exhibition of 1867 (in conjunction with Girard and De Laire). Unfortunately the report of the Vienna Exhibition of 1873, which was also intended to contain a survey of the development of chemical industry during the

previous ten years, has remained uncompleted. When in 1876 the British Council on Education issued invitations for the formation of an Exhibition of Scientific Apparatus it was again owing to Hofmann's endeavours that Germany participated in the same to so great an extent, a participation hardly exceeded by any other country.

We cannot abstain from mentioning some works, touching questions of general interest, which Hofmann has carried out in conjunction with other chemists. They mostly belong to the English period. Thus, in conjunction with Graham and Miller he furnished an exhaustive report upon the water supply of London; with Graham he brought before the English Government a proposal for denaturing spirit by means of methylated alcohol, and with Henry Witt the question of the London sewage. Again, in conjunction with Graham and Redwood, he made experiments directed towards the detection of the quantity of malt used in the production of beer; while finally his report compiled in conjunction with Graham, regarding the presumed adulteration of bitter beer with strychnine, all these works furnish the proof of his extraordinary versatility in chemical matters. Even in his present sphere of action Hofmann continues to exercise his great activity, although the official character of the commissions confided to him often results that his opinions do not come before the public.

We cannot desist from adding a few words regarding Hofmann as a biographer. Any cause for being active in this direction was naturally a painful one, the death of prominent members of the "German Chemical Association." While he undertook to furnish his fellow associates with a sketch of the life and works of the deceased member, compiled with affectionate care, he erected a worthy monument which no one worshipped more than the architect himself. The warm tribute paid to the memory of the departed enables it to be easily seen that when the hand pressed the pen it conveyed at the same time feelings of love for the dear friend passed away. Thus we have from his hand life-sketches of Thomas Graham, Gustav Magnus, Alphons Oppenheim, Heinrich Buff, Friedrich Wöhler, Jean Baptiste, Dumas, Quintino Sella, Hermann Fehling, Gustav Kirchhoff, Adolph Geiger, and Adolph Wurtz. The description of Liebig's active life, which formed the subject of the Faraday lecture, also belongs here.

Outward recognitions of his scientific attainments Hofmann has never been wanting. As early as 1851 he was elected a member of the Royal Society, while he received pecuniary assistance from this source in order to further his labours. In 1854 he received the Large, later the Copley Medal. In 1857 the French Academy placed him upon their list of corresponding members, while in 1864 he received the undivided Prix Jecker for his scientific works. His election as a corresponding member of the Berlin Academy of Sciences in 1858 was followed in 1865, after his return to his native country, by his election to a regular membership of that body; in like manner he is a member of the Munich, Vienna, and St. Petersburg Academies, of the Academy dei Lincei, in Rome, as well as of a large number of other learned societies in Europe and America. The universities of Cambridge and Aberdeen presented him in 1861 with the title of Juristic Doctor. On the occasion of the fifty years' Jubilee of the University of Bonn he was made Doctor Medicinne *honoris causa*. For his labours in the sphere of the chemistry of colours, the "Societé Industrielle de Mulhouse" in 1864 presented him with their Gold Medal, while in 1867 the Jury of the Paris International Exhibition awarded him one of the grand prizes on similar grounds.

Hofmann is decorated with numerous high orders, among others being the Prussian Order pour le Mérite.

While Hofmann during the serious work of the session takes but little leisure or recreation, during the vacations he is fond of affording his body and mind the necessary relaxation by taking journeys in foreign countries. Thus, invariably accompanied by his wife, he has repeatedly traversed the Alps and the Apennines, while by personal visits he has made himself acquainted with the whole of Italy, as also with France, Spain, Greece, the north coast of Africa, Egypt, Asia Minor, Palestine, and a part of Turkey.

Some years since the American Railway King, Henry Villiard, issued a number of invitations to his countrymen, including Hofmann, to assist at the opening of the Great Northern Pacific Railroad. The invitation was gladly accepted by Hofmann, while he availed himself of the opportunity offered, if only in the sense of a rapid flight, of becoming acquainted with the Great Continent from the borders of the Atlantic Ocean to the coast of the Pacific as far as the Gulf of Mexico. Everywhere he met with the most cordial reception on the part of his Transatlantic colleagues, which was heightened into enthusiatic displays of joy whenever it happened that one or the other had formerly been under his charge, as scholars, at Berlin. The simple German *savant* was perfectly overcome when his American friends decided to commemorate his transoceanic journey by having a large gold medal specially struck for the purpose.

All who honour A. W. Hofmann as the eminent representative of chemical science, or who have learnt to know him as the unselfish furtherer of the general good, or who have been connected with him by ties of friendship, will be especially glad to learn that he has been spared to enter upon his seventieth year, in the possession of rare bodily power and undiminished freshness of mind.

May he be permitted for many years to come to remain in the same condition, a blessing to science, of service to his pupils, as well as the joy of all who feel themselves bound with him in ties of friendship.—*Chemiker Zeitung.*

## ULTRAMARINE.

THE following communication from the pen of J. B. Nejedly, of Vienna, appeared in a recent number of the *Chemiker Zeitung*:—

Animated by various articles and notes in your journal under the heading of "The present position of the manufacture of Ultramarine," I would like to draw out of obscurity a little work on this industry which contains much that is true, and furnishes at the same time many comparisons with regard to the present position of the ultramarine industry in Germany.

The work above referred to was printed in the year 1840, and bears the title:—

> "Treatise on the chemico-technical preparation of Ultra-
> "marine colours, according to the discoveries of Leykauf
> "and Heyne, or on the importance of the manufacture
> "of blue and green ultramarine for purposes of science,
> "art, and industry." By Friedr. Wilh. Heyne, president of the Nürnberg Ultramarine Manufactory. Nürnberg: 1840. Printed at the Campe Press.

The preface, which I consider to be well suited to present circumstances, I reproduce verbatim, while from the little work itself I will only quote such sentences as would seem to be suited to the present time, and which are the most important as bearing on the subject.

**Preface.**—The incitement to this treatise was furnished by the utility of the discovery of Herr. Leykauf, instructor of chemistry at the technical schools in Nürnberg, of artificially preparing the well known blue mineral colour styled ultramarine according to simple principles, which discovery was supplemented by the production of the green ultramarine, an equally genuine and beautiful green mineral colour, by the technist Heyne in Nürnberg. A short review of the importance of these two discoveries for mankind in general and for science, art, and industry in particular, will form the main subject of this treatise, which has no other object but that of arousing the attention of all high protectors and stimulators, as well as friends of industry and art, to a newly born industrial branch. At this moment we are living in a period when many industries have got into the stocks, in consequence of far too severe competition combined with other influences, indeed they are barely able to support those engaged in them. If in consequence of this state of things it already becomes of the most vital importance that fresh sources of acquisition should be obtained, it becomes all the more so when by their means at the same time materials come into requisition which the Fatherland possesses in great superfluity, and which otherwise possess no intrinsic value beyond just the expense of extracting them from their natural localities or deposits, and the worth that attaches to them working up for industrial purpose. A source of acquisition in this sense is met with in the manufacture of blue and green ultramarine colours, which in course of time can be raised to an extremely valuable acquisition. May the communications here made result in their being considered worthy of a thorough many-sided investigation and consideration.

REGARDING THE WORK ITSELF.

**Page 21.**—Not long since a prize of 6,000 francs was offered by the "Societé d'Encouragement." This prize was gained by M. Guimet, who has not published his process, and who now furnishes ultramarine at the price of 25 francs

per oz., whereas it otherwise cost 200 francs per oz. Latterly, in 1839, M. Guimet has reduced his price for ultramarine, viz., No. 1, for painting, to 10 francs, a lighter shade being 6 francs per oz. In addition, this manufacturer furnishes lower qualities for carpet and paper manufacturers at 20 francs and 12 francs per lb.

**Page 23.**—Indeed, if we are able to produce ultramarine by means of a polysulphide of sodium and common clay, then the most beautiful and most lasting of all known blue colours, would at the same time become the cheapest of them all.

**Page 27.**—All faults which are known to exist in the old methods are obviated in the new invention of Leykauf and Heyne, while the same offers the following advantages:—

(1) The materials which are treated with it can be brought into use without any special previous chemical preparations, indeed as supplied by Nature, while chemical treatment is entirely unnecessary. In view of the unimportant cost of derivation of the raw material, there cannot consequently be any questions raised with regard to waste.

(2) This method is so simple, that any man of sound intellect can easily work it, without possessing any special chemical knowledge beforehand. As the labour can be easily grappled with, errors can only occur when the grossest carelessness is shown in conforming to the instructions prescribed.

(3) According to the said method one can work according to any desired scale, and, what is best of all, the larger this scale the more favourable are the results obtained, lighter work and excellence of quality.

(4) If the process is carefully conducted everything is in your own power, nothing depending on chance.

(5) Consequently an equal product can invariably be obtained, while this can at will be brought to the most complete stage of perfection at but little greater cost than lower qualities entail.

(6) According to this method you are master of the fire, enabling a retention of colours in any desired shade, of the deepest tone, of the greatest permanency.

From this it appears: That this process is the easiest, the cheapest, and the most complete. Worked according to this method the hope is likely soon to become a reality, that ultramarine may yet become the cheapest of all mineral colours, and as in the same everything rests upon simplicity, the preparation of the article in future will be carried on somewhat after the fashion of baking, brewing, etc.

**Page 32.**—Moreover, there is not only blue ultramarine, but also a pure green, and we may venture the hope that similar combinations in white, black, red, and yellow will soon follow in equal perfection. In consequence of these discoveries, Leykauf and Heyne have erected a factory in Nürnberg, which, according to a circular dated 15th July, 1840, is in operation under the style of "Leykauf, Heyne and Co., and are producing the two ultramarine colours referred to at the present time at the rate of 50 pounds per day.

**Page 33.**—All the mechanical appliances of the factory are at the present time exclusively worked by hand, the number of persons employed being sixteen; while the establishment upon completion of the buildings that are wanting is calculated to employ twenty operatives and two horses. With this extension the factory will be able to turn out 5 cwt. blue and 5 cwt. green weekly, consequently annually 500 cwt. of finished merchantable ultramarine will be brought on the market.

**Page 35.**—Now, as regards the prices ruling at present for Nürnberg ultramarine, these are, as compared with those of the French, more than 500 per cent. cheaper. Blue ultramarine costs, namely, in Nürnberg, quality No. 0, 10 florins per pound; a lighter quality, which is nevertheless darker than the darkest French, at 100 francs 5 florins per pound; a third quality, likewise darker than the seconds French, at 60 franc 3 florins per pound. Green ultramarine, 3fl. 10kr. per pound.

How much further, however, these low prices will be yet reduced after the completion of the factory, may be gathered from a detailed calculation of cost which the chief of this factory has made himself responsible for as being the highest estimate. This calculation of cost is based upon the weekly production of 10 cwt., which the factory will soon be able to turn out, and upon a necessary cost of plant and working capital of 90,000 Rhenish florins, as follows:—

**Page 36.**—Calculation of cost of 500 cwt. blue and green ultramarine.

| | | |
|---|---|---|
| (1) | Raw material and cost of transport ..... | Fl.10,000 |
| (2) | Fuel, including cost of transport of 7,200 cwt. of coal at fl.1-30 ..... | 10,800 |
| (3) | Wages of 20 operatives at fl.250 per annum | 5,000 |
| (4) | Utensils and apparatus..... | 3,200 |
| (5) | Buildings and repairs ..... | 3,400 |
| (6) | Keep for two horses ..... | 600 |
| (7) | Expense of factory ..... | 3,000 |
| (8) | Cost of administration ..... | 2,000 |
| (9) | Unforeseen matters and accidents..... | 2,000 |
| (10) | Interest on building and working capital at 5 per cent..... | 4,500 |
| (11) | Public taxes, insurance, etc. ..... | 500 |
| | Thus 500 cwt. will cost ..... | Fl.45,000 |
| | 1 ,, ,, ..... | Fl.90 |
| | 1 pound ,, ..... | 45kr. |

Forty-five kreuzers, therefore, in accordance with the above, will in future be the production cost of a colour, which, as is well known, could not be obtained for several hundred guldens, while in green it was not procurable at any price.

I venture to hope that the foregoing communication may yet prove of some interest in chemical circles.

## NATURAL GAS IN WEST VIRGINIA.

THE existence of natural gas was well known to the early explorers of the Kanawha Valley. The boring for salt water in this valley in the winter of 1807-8, not only resulted in finding brine, but nearly every salt well became a gas well, the gas in many cases jetting the water into the air and taking fire. From wells only 15 to 20 feet deep the gas escaped in quantities, burning a long time. As early as 1815 a gas well was struck within the present city limits of Charleston.

It is worthy of notice that many of the methods and appliances that have made deep well boring possible were developed and perfected at these salt-gas wells. The chisel-bit, the "jar" sectional tubing, made then of tin and soldered, instead, as now, of iron with screw joints, the "seed bag," were all used at the Kanawha Valley salt wells before oil was found in western Pennsylvania.

So far as has been ascertained the first use of natural gas in manufacturing was in "boiling salt" in this valley by William Tompkins, in 1841, some twenty years after its use for lighting at Fredonia, New York. Having struck gas in boring a salt well he determined to use it as a fuel to "boil his furnace," and for this purpose extemporised a gasometer from a hogshead placed over the reservoir. Into this primitive receptacle he carried the escaping water and gas, the water falling into the reservoir. The gas conveyed through a pipe to the mouth of his furnace, a "salt block" 100 feet long by six feet deep and four feet wide, produced an intense heat under the whole row of kettles.

In 1843 gas was struck in a well bored near Tompkins's, at the depth of 1,000 feet. The force of the gas was so great as to throw a column of salt water 150 feet above the mouth of the well. This is the first "gasser" and "roarer" on record.

Notwithstanding these facts indicate the presence of natural gas in the State, by far the largest amount consumed within its borders is piped from Washington county, Pa. Recently, however, some attention has been given to the development of the gas territory of the State. The Charleston (W. Va.) *Star* says in a recent issue: "It seems now to be pretty well proven that we have about this city a natural gas field of magnitude. We know that for twenty years or more natural gas was practically used for making salt at the Dickinson, Tompkins, Shrewsbury, Fry and others' salt furnaces from 1843 up to the time of the war. We have now the visible fact that the recently drilled 'Edward's well, No. 1,' is blowing a red carbonaceous gas from a dry hole at the volume of not less than a million or two cubic feet per twenty-four hours, perhaps more. And two more wells are going down which are expected to yield even greater flows of gas. The gas found here forty years ago, and used for twenty years, is shown to be still here and in large volume. On these facts we take it that we have a gas field of magnitude about us and only needing development to determine its extent.

THE KIESERITE INDUSTRY.—The sale syndicate for kieserite has raised the price of the article from 50 pf. to 55 pf. per ctr. —*Kuhlow's.*

# SOLUBILITY OF OPIUM ALKALOIDS.

DIETERICH.

THE solubility of the alkaloids was determined by heating the solvent, to which an excess of the finely pulverised alkaloid had been added, setting it aside for twenty-four hours to cool at the temperature (° ?) of the room, and then evaporating known volumes of the solutions.

| SOLVENTS. | Morphine. | Morph. Sulph. | Narcotine. | Narcot. Sulph. | Codeine. | Papaverine. | Narceine. | Thebaine. |
|---|---|---|---|---|---|---|---|---|
| Water ..... | 1.1250 | Very soluble | 1.5000 | Very soluble | Soluble | Sparingly | Soluble | Insoluble |
| Normal ammonia..... | 1.2100 | ..... | 1.5000 | ..... | ,, | Very sparing. | ,, | Sparingly |
| ½ Normal ammonia.. | 1.6200 | ..... | 1.5000 | ..... | ,, | ,, | ,, | ,, |
| Ethyl alcohol ..... | 1.1660 | Soluble | 1.1900 | Soluble | Very soluble | Very soluble | Very soluble | Soluble |
| Methyl alcohol..... | 1.7000 | Very soluble | 1.1560 | ,, | ,, | ,, | ,, | ,, |
| Amyl alcohol ..... | 1.1300 | Sparingly | 1.4150 | ,, | ,, | ,, | ,, | ,, |
| Acetic ether ..... | 1.1665 | ,, | 1.3100 | Sparingly | ,, | ,, | Sparingly | Very soluble |
| Ether ..... | 1.1250 | Very soluble | 1.1780 | Insoluble | Soluble | Soluble | Insoluble | Sparingly |
| Acetone ..... | 1.1800 | ,, | 1.1400 | Sparingly | Very soluble | Very soluble | Sparingly | Very soluble |
| Chloroform ..... | 1.1660 | Insoluble | 1.4000 | Soluble | Soluble | ,, | ,, | ,, |
| Carbon disulphide ... | 1.1250 | ,, | 1.1450 | Sparingly | Very soluble | Sparingly | Insoluble | Sparingly |
| Benzene..... | 1.5000 | ,, | 1.1200 | Insoluble | ,, | Very soluble | Sparingly | Very soluble |
| Petroleum ether ..... | 1.5000 | ,, | 1.5000 | ,, | Sparingly | Insoluble | Insoluble | Sparingly |

Toluene and xylene act like benzene.—*(Rep. d. Anal. Chem.)*

## OIL GAS.

AT the last meeting of the Glasgow Town Council Mr. M'Kellar said he wished to ask the Gas Committee whether they had examined the claims of the Patent Paraffin Oil-Gas Lighting Company; if they had come to the conclusion that these claims were not borne out by that examination, and were not worth going any further into; what answer they had to give to the reports that were given by the various chemists who had examined and tested the illuminating qualities of the gas; and, again, would the Gas Committee agree to re-examine the claims of the Paraffin Oil-Gas Company in Washington-street, and give a full report of whether they think it should be adopted or not?

Mr. Ure said he was afraid Mr. M'Kellar had not been reading his minutes very carefully during the time he had been in the Town Council, or he would have found that the committee had not only considered this question, but had reported to the Council. He read an abstract from the minutes of 8th June, 1887, which were submitted to the Council in July last, in which it was stated that the manager submitted an abstract showing the whole of the results obtained by the practical experiments which had been carried out at the Dawsholm Works for the production of gas from oil. The manager stated that, while the practicability of producing gas from various classes of oil of an illuminating power varying from 17 to 66 candles had been clearly demonstrated by the experiments in question, the abstract now submitted showed that the cost of the production of gas was, in the meantime, considerably in excess of the cost of producing gas from coal, owing to the price at which oil of such a kind as will produce a satisfactory gas can be obtained. The committee had inspected the works that Mr. M'Kellar had referred to, and satisfied themselves thoroughly at that time that they could not produce gas at the price which they were doing from coal. They had no prejudice in favour of coal, and if Mr. M'Kellar had any further light to throw on the subject the convener of the committee would be delighted to receive it. When they reported at that time they had exhausted the question, and found that they could not go profitably into the use of oil instead of coal for producing gas.

## A NOVEL SANITARY PROCESS.

THE treatment of sewage, especially in the case of the metropolis, writes a correspondent to the *St. James's Gazette*, is a subject which, however unpleasant, is highly and immediately important. The present methods adopted by the Metropolitan Board of Works admittedly leave something to be desired. The Board at present use lime and sulphate of iron as precipitants; but the effluent or liquid resulting from this process has still to be deodorised. Permanganic acid is therefore added; though distinguished authorities have stated that this substance, in the quantity used, is both expensive and only partly effective. That the present system is unsatisfactory to the Board itself in some respects is shown by the recent appointment of Sir Henry Roscoe at a remuneration of £1,500 per annum, to give his advice as to the best method of treatment. It may not be generally known that a simple and original process, by which a common substance is employed that has never been used for this purpose before, has been brought under the notice of the Board in various experiments during the last three years. The precipitant in this process consists of nothing but lime, together with—to use the words of the patent—"the brine from herrings or other fish." Singular to say, by the action of lime on fish-brine a powerful reagent is evolved which will effectually sterilise (*i.e.*, destroy the micro-organisms contained in) sewage matter. It is known that putrescence is due to the presence of a certain micro-organism; and since the new reagent kills all micro-organisms and their spores, it also entirely stops putrescence and its odours. The lime employed not only acts on the brine, but precipitates the solid matter, the resulting effluent being bright and clear. The "sludge" is also sterilised and rendered odourless. These points have been proved by experiments at the Crossness outfall works under the supervision of the Board's officers; and samples from these experiments, by agreement between the Board and the projectors of the new scheme, have been carefully tested by the Government analyst at Somerset House. In some of the tests a temperature of between 70 and 75° Fahr. was employed, and the duration of time was from three to four weeks.

## A EUROPEAN BORAX POOL PROBABLE.

LATE London advices apprise us of a probable change in the relations of European borax manufacturers. As yet there is scarcely anything more tangible than a surmise upon which to base the belief that a combination for the purpose of regulating prices is contemplated, but our correspondent is evidently well satisfied that the presence of representatives of German manufacturers in London at the same time that the English makers have sent representatives to town is something more than a coincidence. Taken together with the fact that the European manufacturers have found unrestricted competition inimical to their financial welfare, a suggestion of fact does seem to be contained in the rumour. The producers on the other side have had an opportunity to judge of what combination can do for an industry by noting the results of following the agreement entered into by the American borax producers. If there is a disposition in England to profit by such an example it will not take long to crystallise into practical shape when once the German makers have consented to become parties to the arrangement.

The British producers are anxious to increase the outlet for their borax, and are watching with interest the progress of tariff revision here, seeing in it a prospect of regaining some of the trade in the United States that was lost through

the sharp competition with our own producers after the present tariff came into effect. By a combination with the Germans, the British manufacturers would be assured of remunerative prices at home, and could thus afford to enter this market with prices that would give them an advantage over American competitors.

Something of this sort would seem to be indicated by the recent purchase by one of the largest English producers of the right to work two mines in Asia minor for fifty years, and the purchase by the same concern of a French factory with capacity sufficient to turn out all the borax "for which a market can be found." The latter phrase is significant or not, according to the light in which it is viewed. Further developments in Europe will be awaited with interest.—*Oil, Paint, and Drug Reporter.*

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

J. G.—Yes, we have heard it rumoured; but have no confirmation yet.

R. J. S.—One part in 500; but we do not think it a practicable process.

D. E. T.—The works have always paid good dividends, but all lies in the management.

Inquirer.—Sorry we cannot aid you. Your query is too indefinite, and needs a long and technical reply.

G. L.—The imports will follow shortly; but it is our desire to get the export list going well before we attach the imports.

H. H.—Next week another letter will appear; we cannot afford space for more than one weekly, and the issue of them all together as a supplement is out of the question.

B. J.—Any work on mensuration will give you the information.

T. C. C.—Five pounds. We do not know the address.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—As the editor of the *Chemical News* feels that it is necessary, for certain reasons, to close the correspondence in reference to the Institute of Chemistry, I shall feel obliged if you will allow me space to reply to two letters which appeared in a recent number of that journal. The following is, in effect, a copy of the letter which I sent:—"Having been away from home I have only been able to read the replies (*Chemical News*, vol. lvii., p. 120) to my letter in the previous issue. In one of them I am struck with the fact that there are persons who see meanings in a sentence which the language does not imply, and which the writer of the sentence did not intend. Such persons usually support their arguments by extracts from the poets, and by an artistic admixture of latin or dog-latin quotations. I do not say that Mr. Friswell (the writer of one of the letters who employs poetical latin quotation) is one of those gentlemen, but I do say that he has misread my letter when he assumes that in giving the number of professors and ex-professors, manufacturers, etc., on the council, I desired that they should be removed from it. My statement and figures simply showed that the number of professors is excessive as compared with those representing the other branches of the profession.

A gentleman at the annual meeting said he was told that a number of the voting papers were counted as having opposed the council list, in which my name alone was removed. I asked one of the gentlemen who had been engaged in opening the voting papers if that were true, and he replied that it was not, and that all the papers he saw had a number of names scored out and a corresponding number inserted in lieu thereof, and these names were all or nearly all those suggested in the circular letter bearing my name. I think I am, therefore, justified in believing that another of the *Chemical News* correspondents, "*One who was there*," (although he does not say where) was misled respecting the number of proxies in favour of the president and secretary on the one hand, and of my friends and myself on the other.

Mr. Friswell and the correspondent "who was there" consider that the action advocated by my friends and by me will not serve in any way to maintain the dignity of the Institute, whilst we, on the other hand, believe that our idea carried out would place the Institute in a much more dignified position than it is under the present conditions.

I think the criterion of real knowledge and ability is higher than that of having attended special courses of lectures. A gentleman told me he wished a few weeks ago to engage a senior assistant, and interviewed one who was already either a Fellow or an Associate of the Institute, and who has had a "regular" training in one of the specified colleges (as would have been regarded by Mr. Friswell and his friends as excellent). He asked him what was the action of hydrochloric acid on ferrous sulphide, and the "regularly" trained student replied that it would form sulphuric acid. Other questions equally simple were answered with a somewhat similar approach to accuracy.

We do not say that a student should not attend lectures at any of the specified colleges—quite the contrary—all we say is that provided he can *show* that he has gone through a regular course of sound theoretical and practical chemistry, under an efficient teacher, who is not a mere "crammer," he should be admitted to the examinations of the Institute, which should be sufficiently searching to make the membership of the Institute a criterion of education and ability, and not a mere guarantee that the members have attended one or more of twenty or thirty specified schools or colleges.

If those who have such high opinions of what can be achieved in universities and colleges by means of lectures, and for which kind of training they desire to capture and apply the word "regular," will speak to the average medical man on any subject in which he has been "regularly" trained, he will probably arrive at the conclusion that the training had been exceedingly superficial.

Attendance at lectures at the universities and colleges is, no doubt, the most convenient way of acquiring knowledge of theoretical chemistry, but it is *not necessarily* the most efficient, and at the present time, as it is not compulsory for an analyst in practice to be a member of the Institute, I think it would be more dignified if the Institute demanded simply (at all events for a few years as a trial) that the student should be admitted to its examinations if he can give evidence of his having been efficiently and regularly trained in theoretical and practical chemistry, physics, and mathematics, and of his having received a satisfactory general education, and the question of his having attended one of a specified number of colleges be not held of primary importance.—I am, etc.,

William Thomson.

Manchester, 13th April, 1888.

## PREPARATION OF CRYSTALLISED CHROMIC ACID FROM LEAD CHROMATE.

BY G. KLIEBHAN.

Lead chromate is treated with such a quantity of concentrated $H_2SO_4$ that two parts of acid are employed to one part of the dry salt. The mixture is allowed to stand some time—eight to ten hours—when the decomposition will be complete. If warmed, the reaction will be more rapid. The mass is then treated with water; lead sulphate separates, from which, after subsidence, the supernatant red liquid is poured, the same being a mixture of chromic and sulphuric acids. The evaporation of the clear, red liquid is continued until succussion commences, when the heat is removed. On cooling the greater part of the chromic acid separates in very handsome, carmine red crystals, an additional quantity being obtained on further concentration of the mother liquid. Chromic acid prepared in this way proves to be purer than that by any other method.

This is also the place to speak of a partly admitted and partly denied combination of chromic acid with sulphuric acid. The following facts indicate the probable existence of such a combination.

Chromic acid added to lead-free $H_2SO_4$ dissolves with red colour. The gradual addition to a further quantity of chromic acid is followed by a yellow brown colour, and after several hours a precipitate of a similar colour separates, which is not soluble in conc. $H_2SO_4$. It dissolves, however, in $H_2SO_4$ at 50° R (63°C) separating again on cooling. On addition of the least quantity of water, crystal chromic acid separates. The same brown substance results when $SO_3$ is mixed with chromic acid.

From this it appears that under certain circumstances $CrO_3$ plays the part of a base toward $SO_3$, which must be taken into consideration in a method of preparing $CrO_3$, *e.g.*, in the method by $K_2Cr_2O_7$ the $CrO_3$ is separated often with difficulty from the last portions of $H_2SO_4$ employed,—(*Chem. u. tech. Ztng.*)

## NEW CUSTOMS TARIFF OF ITALY.

THE following is a statement showing the rates of import duty hitherto levied in Italy upon chemicals, medicinal products, perfumes, colours, wood and manufactures of wood, gold and silver wares, clocks, watches, paper, stationery and books, articles of food, animals (living), stone, unwrought and wrought, and other miscellaneous articles, the produce and manufacture of the United Kingdom, under the old customs tariff, as compared with the rates now levied under the new general tariff of Italy which came into operation on the 1st January last. Under a commercial treaty with Austria, which was concluded on the 7th December last, certain reductions have been effected in the duties on various articles imported into Italy. These reductions, which have in each case been notified in the following statement, will apply to British goods under the most-favoured nation clause.

NOTE.—*Kilogramme* = 2·204 *lb. avoirdupois; Hectolitre* = 22 *gallons; Lira* = $9\frac{6}{10}$*d.*

### CHEMICALS, MEDICINAL PRODUCTS, PERFUMES, COLOURS, ETC.

| | *Old General Tariff.* Lire. | | *New General Tariff.* Lire. |
|---|---|---|---|
| ACIDS: | | | |
| *a* Arsenic | 100 kilos. | 2·00 | Free |
| *a* Boric | Free | | Free |
| *a* Gallic and tannic | Free | | Free |
| *a* Acetic, impure | Free | | 100 kilos. 1·00 |
| *a* Hydrochloric | 100 kilos. | 1·00 | ,, 1·00 |
| *a* Nitric | ,, | 1·00 | ,, 1·50 |
| *a* Sulphuric | ,, | 0·50 | ,, 0·50 |
| *a* Tartaric | ,, | 8·00 | ,, 10·00 |
| Acetic, liquid (including common vinegar), containing of acetic acid, pure: | | | |
| 10 per cent. or less | ..... | ... | ,, 10·00 |
| From 10 per cent. to 50 per cent. | ..... | ... | ,, 60·00 |
| Above 50 per cent. | ..... | ... | ,, 90·00 |
| Acetic, crystallised | ..... | ... | ,, 110·00 |
| Not distinguished | ..... | ... | ,, 10·00 |
| *a* Ammonia, potash, and caustic soda, pure | 100 kilos. | 5·00 | ,, 5·00 |
| *a* Potash and soda, caustic, impure | ,, | 0·50 | ,, 0·50 |
| *a* Ether and chloroform | ,, | 4·00 | ,, 4·00 |
| | With the addition of the duty on 200 litres of alcohol. | | With the addition of 420 lire for the alcohol contained. |
| Volatile oils or essences (weight of package included: | | | |
| *a* Rose | Kilo. | 40·00 | Kilo. 40·00 |
| *a* Orange and similar fruits | ,, | 1·50 | ,, 1·50 |
| *a* Clove | ,, | 1·50 | ,, 7·50 |
| *a* Peppermint | ,, | 1·50 | ,, 7·50 |
| *a* All other | ,, | 1·50 | ,, 3·00 |
| *a* Essences of rum, cognac, and others containing spirit | ,, | 0·85 | ,, 1·02 |
| | In addition to the duty. | | In addition to the duty. |
| Woods, roots, barks, leaves, lichens, flowers, herbs, and fruits for dyeing and tanning: | | | |
| Not ground | Free | | Free |
| *a* Ground | 100 kilos. | 2·00 | 100 kilos. 2·00 |
| Gambier | Free | | Free |
| Indigo, cochineal, and kermes | Free | | Free |
| Prussiate of potash, yellow and red | Free | | Free |
| Colours derived from tar or other bituminous substances: | | | |
| Dry | 100 kilos. | 15·00 | Free |
| In liquid or paste | ,, | 10·00 | Free |
| Colouring extracts from dyewoods and all other dyestuffs | ,, | 12·50 | 100 kilos. 12·50 |
| Colours in cakes and powders, or in any other form | ,, | 12·00 | ,, 12·50 |
| Charcoal | Free | | Free |
| ALKALOIDS: | | | |
| (4) Salts of quinine, and other | Kilo. | 5·00 | Kilo. 12·00 |
| *a* Oxide of iron, lead, and tin | 100 kilos. | 2·00 | 100 kilos. 4·00 |
| *a* Oxide of Zinc | ,, | 2·00 | ,, 5·00 |
| *a* Acetate of alum, iron, lead, and copper | ,, | 1·00 | ,, 1·00 |
| CARBONATES: | | | |
| *a* Barytes | ,, | 2·00 | ,, 2·00 |
| *a* Magnesia | ,, | 25·00 | ,, 25·00 |
| Lead | ,, | 5·00 | ,, 8·00 |
| *a* Soda | ,, | 0·50 | ,, 0·50 |
| *a* Potash | ,, | 0·50 | ,, 0·50 |
| *a* Magnesia, calcined or caustic | ,, | 20·00 | ,, 50·00 |
| HYPOCHLORIDES: | | | |
| *a* Of lime, potash, and soda | ,, | 1·00 | Free |
| CHLORIDES: | | | |
| *a* Of lime | ,, | 4·00 | Free |
| Of potash | Free | | Free |
| *a* Of magnesia | 100 kilos. | 1·00 | 100 kilos. 1·00 |
| NITRATES: | | | |
| *a* Of silver | Kilo. | 5·00 | Kilo. 5·00 |
| *a* Of soda, refined, and potash | 100 kilos. | 3·00 | 100 kilos. 3·00 |
| Of soda, raw | Free | | Free |
| *a* Borax or borate of soda | 100 kilos. | 0·50 | 100 kilos. 0·50 |
| Sea and rock salts | Prohibited | | Prohibited |
| SULPHATES: | | | |
| *a* Of alum, potash, and other alums | 100 kilos. | 0·50 | 100 kilos. 0·50 |
| *a* Of barytes | ,, | 1·00 | ,, 1·00 |
| *a* Of iron and manganese | ,, | 2·00 | ,, 2·00 |
| *a* Of copper, zinc, and bisulphate of copper and iron | ,, | 2·00 | ,, 2·00 |
| *a* Of magnesia | ,, | 1·50 | ,, 1·50 |
| *a* Of soda | ,, | 0·50 | ,, 0·50 |
| *a* Of potash | ,, | 0·50 | ,, 0·50 |
| Tartar (bitartrate of potash), lees of wine and argols | Free | | Free |
| *a* Cream of tartar | 100 kilos. | 4·00 | 100 kilos. 4·00 |
| (1) Sulphuret of mercury (cinnabar or vermilion | ,, | 100·00 | ,, 100·00 |
| *a* Phosphorus | ,, | 4·00 | Free |
| *a* Nitro-benzene, raw | ,, | 150·00 | 100 kilos 4·00 |
| *a* Pyrolignites of iron, lead, lime, and alum | ,, | 4·00 | ,, 4·00 |
| *a* Chemical products not distinguished | ,, | 4·00 | ,, 4·00 |
| Liquorice roots | Free | | Free |
| Medicinal herbs, roots, etc., not distinguished | 100 kilos. | 2·00 | 100 kilos. 2.00 |
| *a* Cassia and tamarind, raw | ,, | 7·00 | ,, 7·00 |
| *a* Manna, raw or in sticks | ,, | 10·00 | ,, 10·00 |
| CAMPHOR: | | | |
| *a* Raw | ,, | 2·00 | Free |
| *a* Refined | ,, | 15·00 | 100 kilos. 25·00 |
| PEELS AND RINDS: | | | |
| Of lemons, oranges, and similar fruits, fresh or dried | Free | | Free |
| Cinchona | Free | | Free |
| EXTRACTS OR JUICES: | | | |
| Orange | Free | | Free |
| Citron and lemon, raw | Free | | Free |
| Citron and lemon, concentrated | Free | | Free |
| *a* Liquorice | 100 kilos. | 10·00 | 100 kilos. 10·00 |
| *a* Aloe and medicinal vegetables not otherwise mentioned | ,, | 10·00 | ,, 10·00 |
| Medicinal articles not distinguished | ,, | 10·00 | ,, 10·00 |
| Compounded medicines (including the weight of the bottle or wrapper) | ,, | 120·00 | ,, 120·00 |
| PERFUMES (including the weight of the bottle or wrapper): | | | |
| (2) Alcoholic | ,, | 60·00 | ,, 100·00 With the addition of 144 lire for the alcohol contained. |
| (3) Non-alcoholic | ,, | 60·00 | 100 kilos. 100·00 |

*a* Articles not mentioned in the conventional tariff, and to which the duty of the general tariff therefore applies.
(1) The conventional tariff duty was 25·00 lire per 100 kilos.
(2) Thirty-seven and a half lire per 100 kilos. was the duty under the conventional tariff for alcoholic perfumes. Excise duty in addition.
(3) Conventional duty 12·00 lire per 100 kilos.
(4) Under the Italian treaty with Germany these alkaloids pay 5 lire per 100 kilos.

## SOCIETY OF CHEMICAL INDUSTRY.

### GLASGOW AND WEST OF SCOTLAND SECTION.

THE sixth meeting of the session was held in Glasgow, on the 10th inst. Dr. J. Clark read a paper on the estimation of phosphoric acid by means of nitrate of silver, in which, as a start, he referred to what had been done by practical chemists on the continent, subsequently detailing the data which had been obtained from a series of experiments engaged in by himself. These details were of little interest in themselves, but Dr. Clark, in closing, freely acknowledged that his efforts in this walk had, in their results fallen short of his anticipations as yet. Prof. Mills then took up the photochemical estimation of graded tint, reading a paper of much value to the dyeing and photographic sections of the science, but necessarily involving a treatment which did not appeal intimately to more than a fraction of the meeting. Prof. Mills described the photochemical investigations in which he and his collaborators had been engaged and produced a strong body of figure results, which will prove of value for student purposes when available in printed form. His descriptive and arithmetical matter was supplemented by several diagrams of the photographic results obtained. The close of the paper was followed by appreciative comments on the part of the chairman, and a few remarks from one of the members; but the special quality of the subject precluded anything like a general discussion. The chairman exhibited a liquid diffusimeter of novel merit, and took some pains in detailing the distinctive properties thereof; after which the secretary tabled his report for the year, showing the present membership of the section increased to a total of 240, after striking a balance between 11 resignations and 37 members newly elected. The meeting closed by the appointment of office-bearers for the year, Mr. J. J. Coleman being re-elected chairman; Mr. Tatlock, vice-chairman; and Mr. Henderson, secertary.

# Trade Notes.

Income Tax.—A firm of manufacturing chemists writes thanking us for the hint we gave on page 60 of the present volume respecting this subject. The writer says, "we have saved sufficient to pay our subscription to the *Chemical Trade Journal* for many years to come." Another firm writes, "the *interest* we have saved from a perusal of the article in question is sufficient to pay several subscriptions to your journal *for ever*." Surely these statements should cause others to look into their income tax accounts.

Trade and Manufactures in Mannheim.—A foreign consul in Mannheim says that the production of soda and ammonia in 1887 was entirely absorbed by the demand, but the prices remained low, and, in fact, below the average of the previous year. As regards silicate of potash, this industry is unfortunately situated, as the prices obtainable scarcely cover the cost of production, and, moreover, it will no longer find an outlet in Italy when the new tariff comes fully into force. Great efforts are being made to increase the trade in Russian petroleum, but as yet with indifferent success, since seven-eighths of the importation still consists of American oil; in fact, the Russian product is 2·8 per cent. heavier than the American, and consequently has to be sold at a lower price, which, however, does not compensate for other disadvantages it possesses. The manufacture of sulphate of quinine is carried on extensively in Mannheim, but of late it has not proved very profitable. During the year 1887 the price declined continually, so that it eventually scarcely covered the cost of production. The engineering works were well supplied with orders, especially for locomobiles and steam cranes. The foundries were also well occupied, and the agent of a Belfast company has established a stove manufactory which promises to be successful. With respect to cellulose, the largest works in Germany are established in Mannheim, and had last year to triple the number of its hands and boilers.

The "Taming" of Fluorine.—Writing to the *Standard* on the 26th ult. on the "Taming" of Fluorine, a correspondent says:—The merit of discovering a wide range of the capabilities of fluorine for industrial purposes and securing its base is, I think, due to the late Mr. Henry Maudslay. Some thirty years ago I was consulted by that gentleman as to the best mode—not of turning to profitable account, for he was persuaded the trade was not prepared for it—but of placing on record his claim to the discovery of certain wonderful properties of this substance. With the papers necessary for drawing this specification was a piece of glass tubing cut into sections, which screwed into each other water-tight, the screws having been turned at the Lambeth factory in a common lathe, with ordinary tools lubricated with hydrofluoric acid. The patent No. 2,821 of 1858 was taken out simply as applied to glass tubes. The invention was unnoticed on its introduction to the world. It was the custom at that time for the Messrs. Macmillan to hold on Thursdays a sort of free and easy reunion of Cantabs and others interested in literary and scientific matters, and as my contribution to the chat of the evening on one of those occasions I mentioned this and some other cases as instances of inventions which had resulted from accident. Mr. A. Macmillan, who was present, asked me to put together the substance of my remarks for his magazine, and the result appeared in the number for May, 1861. M. Henry Maudslay was persuaded that, in spite of the 'fizzle' in which the particular invention mentioned ended, the day would come when the principle would be appreciated."

The Welsh Gold Mines.—Mr. Pritchard-Morgan yesterday announced that he had cleared up the work of the past fortnight at his Gwynfynydd gold mine, with the result that 628 ounces 7 grains of smelted gold have been realised from 334 tons of crushed quartz, making an average of nearly two ounces of gold per ton. The gold newly extracted is valued at upwards of £2,000, and will be despatched to London at once. This is the largest amount which has been crushed since the mine was opened. The miners work in shifts, night and day. Electric lighting apparatus is now in course of erection at the mines.

The Newest Industry.—In Nebraska, where glandered horses are exterminated by order of the authorities, the State pay the owner for the value of the animal. It is said quite a profitable business is carried on by parties who take over the State line lots of diseased horses from Dakota, Iowa, and other localities for the purpose of receiving the bounty.

Italian Customs.—Information has been received at the Foreign Office from Her Majesty's Ambassador at Rome that a notification has been issued by the Italian Director-General of Customs that, after the 10th inst., invoices will no longer be accepted as proof of the origin of goods imported into Italy. All goods, in order to enjoy conventional treatment, must be furnished with a certificate of origin, except such as have come straight from the country of production or which have been merely transhipped in a French port.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

There is a slight improvement in bleaching powder up to the mark of a trifling rise in value, and the demand for chemicals generally is perhaps rather less languid, although in no other case does the amendment go to the extent of hightening price. Bichromates form an exception, having fallen off lamentably over the week, whose register of orders is the scantiest of any for a considerable time. The manufacture of bichromate of soda seems to have got into a very odd position in this country, for while orders with us become scarcer and scarcer, the German makers on their part appear to be selling beyond their make, and of the few continental despatches which have gone from here, a portion is to supply the surplus needs of these same oversold rivals. Paraffin chemicals are still on the drooping side, and there is to be noted a further fall in at least two lines of the section. Burning oil, paraffin scale, and wax are all down now to the combination price fixtures, from which (theoretically) there can be no further drop. Sulphate of ammonia keeps last week's, £12 to £12. 2s. 6d. f.o.b. Leith, for immediate delivery, and as for forward there is practically nothing, although a year's supply is rumoured to have been contracted for at about £11. 5s. General prices current are:—Soda crystals, 40s. net Tyne; alum in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid £41 net Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76°, £8. 5s., 70/72°, £6. 13s. 9d., 60/62°, £5. 15s., and cream, 60/62°, £5. 15s., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5, and 1 cwt. casks, £5. 5s. net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, £1. 0s. 6d., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. 6d. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 % and 6 % to Scotch and English buyers respectively; nitrate of soda, 10s. 4½d.; chlorate of potash, 5¾d., less 5 % any port; sulphate of ammonia, £12 to £12. 2s. 6d., f.o.b. Leith; sulphate of copper, £21; paraffin scale, hard, 2 1/16d., soft, 2d.; paraffin wax, 120° semi-refined, 2 11/16d.; paraffin spirit, 4½d.; burning oil, 5⅜d. to 6d.; lubricating oil, 865°, £5. to £5. 5s., 885°, £6 to £6. 10s., and 890/95°, £7. 10s. to £7. 15s. Western imports include 17,806 bags sugar (Greenock), 5,120 tons iron ore, 1,197 tons pyrites of copper, and 90 barrels paraffin wax.

## THE LIVERPOOL MINERAL MARKET.

There is very little change to report in the market this week, prices remaining without alteration. Manganese: Although arrivals have been small, there is no alteration to report in prices. Magnesite (containing 98 per cent. of carbonate of magnesia) without alteration at 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite (Irish Hill brand) continues in good demand at full prices: 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals continue small, and prices are firmer—87s. 6d. to 90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) in fair demand, and brings full prices. Selected crystal is scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. China Clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn). Pumicestone in demand; ground, at £6. 10s. to £7; specially

selected lump, finest quality, £10 to £10. 10s. Iron ore continues to be inquired for—Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone is in fair demand, stocks being low, at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore in fair demand, and prices are firm, with a probability of an increase. Antimony ore firmer; £16 to £22 for fair quality. Antimony metal, from £50. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar, 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; other qualites, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

Chemicals have ruled steady without material alteration in prices. Soda-ash 1d. up. Caustic soda: 60 % white, £5. 17s. 6d.; 60 % cream, £5. 15s.; 70 % white, £6. 17s. 6d.; 74 % £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10. Nitrate of soda: There is little improvement at 9s. 6d. to 10s. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 5s. to £7. 17s. 6d. for hardwood, and £7. 10s. softwood. Saltcake at 21s. Bichromate of potash at 4¼d. Bichromate of soda, 3¼d. Carbonate of potash, £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9; hydrate of barium, 12s.; dioxide of barium, 8½d. per lb. Arsenic, £11. to £11. 5s. Lump, little offering. Saltpetre: Crystals, 23s.; ground 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax, unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Montreal potashes, 24s. Chloride of zinc (solid) £18.

## THE LIVERPOOL COLOUR MARKET.

Colours are without change. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 60s. to 65s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C. 45s., 55s., to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba: Finest white, 60s.; good, 40s. to 50s. Rouge; Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

There are no changes of important character to record for the past week. The course of prices seems to be still in a downward direction, with but few exceptions. Sulphate of copper does not find any better outlet at the reduced price, and offers freely at £20. 15s. to £21. Yellow prussiate of potash is in similar position at the reduced price of 6¾d. Litharge, lead acetates, and nitrate of lead are the shade lower in price if anything, owing both to lack of orders and the lower price of the metal. Tin and tin crystals are inclined to go lower, and the latter offer at 9½d. to 9¾d. Soda-ash, crystals, and bleaching powder continue to meet with fair demand. Hardwood bleach is firmer at £7. 17s. 6d. f.o.b. Caustic soda is also slightly firmer, owing to increased amount of business. Acetates of lime continue dull, and some concessions have been made to force sales. Acetic acid is correspondingly weak. Ammonia carbonate and muriate are still very quiet. Carbolic acids are also sharing in the general depression, and show some weakness in price.

## THE ALKALI TRADE.

There is but little fresh to report in this market without it be the slight spurt which has been made in caustic soda, this having advanced some few shillings per ton during the week. There is no doubt this will have the effect of hardening saltcake prices, and we hear already that some buyers, by reselling, are endeavouring to keep the price in *statu quo*, but we imagine without success, as, at the present moment, there is less being made than usual. Chlorate of potash has been for some time change for a shilling, but now the price is below cost of production, and we hear one large maker has determined to close that portion of his establishment and confine his attention to "bleach," which still leaves a good margin.

## THE TAR PRODUCTS MARKET.

Tar products generally manage to hold their own so far as prices are concerned, but the state of the benzol market is such that we hear very conflicting reports; on the one hand we are assured there is no change, while from other sources we learn that the prices refiners have been giving for crude naphtha is 1d. higher than it was last week—90's benzol in *statu quo*, while solvent naphtha is in good request at old rates. Anthracene is still firm at former prices, and there seems to be no signs of any decline yet. Carbolic acid still remains firm, though from some quarters we have prognostications of weakness. Pitch has been moving off freely during the cold weather, though there is no marked improvement in price, and creosote is still being eagerly inquired for by those manufacturers who use it as an illuminating agent. The rush continues for tar, and we hear that the Mirfield production has been sold to a Manchester firm for 24s. 6d.

## THE SULPHATE OF AMMONIA MARKET.

The sulphate of ammonia market shows less firmness than at this time last week, and the demand is principally either for prompt shipment or for April delivery. £12 is about to-day's figure f.o.b. at Hull and Leith, while £12. 3s. 9d. is reported as being the value for London outside makes. Beckton is reported £12. 3s. 9d., but whether sales have been made at this price it is difficult to say, as we have heard of some that was recently sold at £12. 2s. 6d. It is considered that these prices are not permanent, as the enormous shipments of nitrate of soda in January, destined to arrive in Europe at the end of April and beginning of May, must have some effect upon the sulphate market. We understand that the quantity exported from Iquique, Pisagua, and other ports during January amounted to nearly 1½ millions of quintals, whereas in January, 1887, rather less than 800,000 quintals only were exported,

# New Companies.

Alfred R. Matthews Limited (Mineral Water Manufacturers).—Capital, £7,500 in £1 shares.

Anglo-Pacific Steel Company Limited.—Capital, £63,000 in £4. 4s. shares.

Ashby's Cobham Brewery Company Limited.—Capital, £48,000 in £1,000 shares.

British Borneo Guano Company Limited.—Capital, £100,000 in £1 shares.

British Sodium and Aluminium Company Limited.—Capital, £1,050,000 in £10 shares.

Britannia Fruit Preserving Company Limited.—Capital, £12,000 in £50 shares.

Cardiff, South Wales, and Monmouthshire Hide, Skin, Fat, and Wool Company Limited.—Capital, £3,000 in £1 shares.

Cornish China Clay Railway Company Limited.—Capital, £20,000 in £1 shares.

Deseada Cobalt and Copper Mines of Spain Limited.—Capital, £20,000 in £1 shares.

Fenner and Company Limited (Oil Merchants).—Capital, £60,000 in £10 shares.

General and Domestic Inventions Company Limited.—Capital, £60,000 in £5 shares.

E. Green & Son Limited (Manufacturers of Fuel Economisers).—Capital, £130,900 in £10 shares.

Grenoble, St. Etienne Breweries Company Limited.—Capital, £200,000 in £10 shares.

Grover Contract Company Limited.—Capital, £25,000 in £5 shares.

Hull Portland Cement Company Limited.—Capital, £10,000 in £1 shares.

Kerosene Company Limited.—Capital, £300,000 in £10 shares.

Liverpool Photographic Supply Company Limited.—Capital, £2,000 in £1 shares.

Lower Weardale Minerals Company Limited.—Capital, £50,000 in £1 shares.

Mineral Oil Extraction Company (Rose's Patent) Limited.—Capital, £200,000 in £1 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Manufacture of Wooden Bungs.** A. Dufty. 5103. April 6.
**Apparatus for Heating and Dyeing.**—(Complete Specification.) T. J. Disturnal. 5106. April 6.
**Machinery for Washing and Scouring Fabrics.** S. Crowther. 5115. April 6.
**Manufacture of Tin Cans.** A. W. Maconochie. 5123. April 6.
**Photographic Apparatus.** J. Hines. E. Howell, and A. Howell. 5140. April 6.
**Treatment of Slag.** E. Fisher and J. P. Cramp. 5145. April 6.
**Glazing Paper and Tinfoil.** J. McNish. 5156. April 6.
**Automatic Reciprocating Fluid Engine.** T. Thorp. 5167 April 7.
**Miners' Safety Lamps.** J. T. Key. 5171. April 7.
**Storage Batteries.** H. Edmunds. 5191. April 7.
**Pulping Fruit.** H. Forman. 5195. April 7.
**Nickel-plated Coins.** E. Martin. 5200. April 7.
**Kneading Machines.**—(Complete Specification.) R. Haddan. 5207. April 7.
**Production of Solutions Containing Sulphurous Acid.** J. S. McDougall and J. T. McDougall. 5212. April 7.
**Porous Stone for Use as Burners for Lamps, etc.** W. D. Gooch, F. H. Varley, and F. B. Lidstone. 5214. April 7.
**Purifying Water for Boilers.** G. W. Allen and H. J. A Bowers. 5223. April 9.
**Heating and Circulating Feed Water in Boilers.** A. McLaine. 5228. April 9.
**Combined Motor and Refrigerator.** F. N. Mackay. 5231. April 9.
**Colour Mixers.** A. F. Wenger. 5234. April 9.
**Condensing, Cooling, and Heating Fluids.** J. H. Breze. 5246. April 9.
**Treatment of Tobacco Enclosed in Tins.** H. H. Wells. 5261. April 9.
**Denitrating and Dyeing Pyroxil.** Le Vicomte Hilaire de Chardonnet. 5270. April 9.
**Packages for Liquid Blue.**—(Complete Specification.) J. W. Kirkpatrick. 5273. April 9.
**Gas Producers.** E. Brook. 5283. April 10.
**Apparatus for Heating Water and Generating Steam.** H. Aitken. 5296. April 10.
**Recording Thermometers.**—(Complete Specification.) W. P. Thompson. 5312. April 10.
**Manufacture of Aluminium.** S. Pearson, J. Liddon, and J. H. Pratt. 5316. April 10.
**Disinfecting Drains, Sinks, etc.**—(Complete Specification.) G. F. Restall. 5321. April 10.
**Portland Cement.**—(Complete Specification.) T. H. Lodge. 5333. April 10.
**Boilers for Preparing Paper-making Materials.** J. S. McDougall and J. T. McDougall. 5344. April 10.
**Chemical Fire-extinguishing Apparatus.**—(Complete Specification.) S. McC. Godfrey and C. G. Meeker. 5350. April 10.
**Arc Lamps.**—(Complete Specification.) J. H. Holmes. 5362. April 11.
**A Compound for Prevention and Cure of Swine Fever.** H. Stephenson and J. Gosling. 5367. April 11.
**Apparatus for Straining Liquids.** F. Wrigley. 5369. April 11.
**Manufacture of Sulphide of Zinc.** G. J. Geary. 5371. April 11.
**Treating Iron and Steel Slag for the Production of Alkalies.** T. Twynam. 5386. April 11.
**Clinical Thermometers.** W. C. Pepys. 5392. April 11.
**Galvanic Batteries.** A. F. St. George and C. R. Bonne. 5393. April 11.
**Manufacture of Paint.** R. Stone. 5399. April 11.
**Gas Lamps.** H. Vale. 5400. April 11.
**Colouring Matters.** H. H. Leigh. 5404. April 11.
**Oil Lamps.** W. D. Gooch, F. H. Varley, and F. B. Lidstone. 5413. April 11.
**"Temperance Ale."** J. Harris. 5416. April 12.
**Cooling or Condensing Vapours.** W. Schmidt. 5418. April 12.
**Electric Current Generator.** W. Robson. 5421. April 12.
**Separating Liquids from Solid Matters.** J. S. Sawrey and H. Collet. 5426. April 12.
**Pulverisation of Liquids.** W. E. Heys. 5432. April 12.
**Lamp Wick.** J. G. Hill and C. H. Bryant. 5445. April 12.
**Preparation of Antiseptics.** W. Black and W. L. Rennoldson. 5451. April 12.
**Bleaching.** Brin's Oxygen Co. Limited. 5453. April 12.
**Manufacture of Aluminium.** W. Cross. 5461. April 12.
**Lighting Apparatus.** A. Treeby. 5466. April 12.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

G. R. Postlethwaite, G. Arundale, and H. C. Joplin, under the style of the Excelsior Patent Lamp and Burner Company, Birmingham, lamp and burner manufacturers, as far as regards G. Arundale.
F. White & Son, Retford, manure manufacturers.
J. Holdsworth and J. Marshall, under the firm of the Soho Oil Company, Oldham, oil merchants, refiners, and importers, and grease manufacturers.
E. L. Cockrell & Co., Newcastle-upon-Tyne, oil merchants.
E. L. Cockrell & Co. and Cockrell & Co., Newcastle-upon-Tyne and Leeds, oil merchants.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Clarke, Thomas, Walsall, currier.

### Adjudications.

Barnes, Lawrence Robert (trading as Barnes & Co.), York, chemist and druggist.
Barnes, William Jacob, Rainham, Essex, chemical manufacturer.
Isherwood, Joseph, Denton, Lancashire, hat manufacturer.
Stanford, Enoch (trading as E. Stanford & Co.), Newport, and Tynewydd Tin Works, near Newport, tinplate manufacturer.
Broadbent, John (trading as John Broadbent & Co.), Hyde, Cheshire, hat manufacturer.
Wyatt, Henry, Southall Green, Southall, late of Hounslow, oil and colourman.
Clarke, Thomas, Walsall, currier.
Kelly, John Anderson, Ida-street, Bromley-by-Bow, oil and colourman.

### First Meetings and Public Examinations.

Isherwood, Joseph, Denton, Lancashire, hat manufacturer. April 23, Official Receiver's Office, Manchester. May 17, Town Hall, Ashton-under-Lyne.
Storr, Bartol, Boston, mineral water manufacturer. April 26, Deputy Official Receiver's Office, Boston. May 3, Sessions House, Boston.
Ross, Arthur, jun., Cripps, Isaac, and Cripps, Henry (trading as Cripps, Ross & Co.), Swan Mead, Bermondsey, size and gelatine makers. April 24, 33, Carey-street, Lincoln's Inn. May 2, 34, Lincoln's Inn Fields.

### Notices of Dividends.

Hilton, William, Whitefield, near Manchester, chemist and druggist. First and final dividend of 1s. 4½d., April 25, 16, Wood-street, Bolton.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

## THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending April 10th.*

**Alum—**
Sydney 5 t. 7 c. £26
Cape Town 1 11 13

**Ammonia (liquid)—**
Calcutta 5 cs. £70

**Bisulphite of Soda—**
Melbourne 8 cks. £44

**Borax—**
Constantinople 13 c. £19
Dantzic 3 cks. 37
Rotterdam 2 ,, 27

**Brimstone—**
Madeira 170 brls. £136
Lisbon 300 ,, 243

**Camphor—**
Melbourne 2 cs. £31

**Carbolic Acid—**
Cape Town 21 pkgs. £25
Rotterdam 24 runlets. 190
Yokohama 4,000 lb. 333
Pt. Otago 5 cs. 42

**Carbolic Crystals—**
Yokohama 5,000 lb. £378

**Carbolic Disinfectant—**
Invercargill 5 cs. £15

## CHEMICAL EXPORTS—*Continued.*

**Carbonate of Ammonia—**
Bordeaux 15 brls. £65
New York 13 t. 5 c. 375

**Caustic Potash—**
Melbourne 25 dms. £38
Sydney 1 t. 3 c. 20

**Caustic Soda—**
Algoa Bay 1 t. 5 c. £64
Melbourne 18 pkgs. 71

**Chemicals—**
Monte Video 2 cks. £22
Halifax 6 cs. 49
Melbourne 11 cs. 41
Trinidad 1 ck. 13
Auckland 4 cs. 58
Natal 16 cs. 49
Bombay 3 dms. 27
Yokohama 20 cs. 307
Melbourne 3 cs. 36
Calcutta 6 cs. 37

**Chlorate of Potash—**
Sydney 5 t. £260
Libau 20 kgs. 53
Yokohama 5 t. 275

**Citric Acid—**
Buenos Ayres 5 c. £42
Libau 10 83
Genoa 10 85
Algoa Bay 2 17
Dantzic 5 44
Hamburg 10 85
Antwerp 12 108
Amsterdam 11 95
New York 25 220

**Collodion—**
Yokohama 1 cs. £16

**Cream Tartar—**
Brisbane 0 t. 10 c. £68
Lyttleton 0 16 102
Melbourne 1 10 186
Melbourne 1 tank 130
Canterbury 0 t. 10 c. 62
Sydney 3 10 452
Newcastle 0 2 12

**Cyanide of Potash—**
Cape Town 5 c. £21

**Disinfectants—**
Cape Town 20 pkgs. £24

**Guano—**
Trinidad 167 t. 0 c. £1,816
Demerara 99 8 1,070
Jersey 10 0 100
Guadeloupe 400 0 4,000
Cherbourg 70 0 700

**Hydro Carbon—**
Brussels 1 t. 15 c. £25

**Insect Powder—**
Cape Town 1 cs. £24

**Manure—**
Invercargill 5 cs. £35
Rotterdam 58 t. 1 c. 298
Gothenburg 296 9 1,062
Valencia 629 0 4,760
Demerara 10 0 124
Bordeaux 55 and 100 bags. 205
Dunkirk 150 t. 700
Charente 1,750 bags 50 brls. 640
Landerneau 287 t. 0 c. 2,900
Alicante 75 0 450
Barcelona 22 15 184
Trinidad 20 0 200
,, 26 cks. 37
Barbadoes 30 t. 0 c. 390

**Manure—*continued.***
Cullera 74 t. 0 c. £575
Cherbourg 65 0 200
Treport 5 3 50
Rouen 908 bags. 390
St. Lucia 44 cks. 111
St. Kitts 67 t. 14 c. 398
Dominica 6 tcs. 36

**Oxalic Acid—**
Boston 40 cks. £308
Hamburg 4 ,, 32

**Phosphorus—**
Otago 20 cs. £201
Malta 1 cs. 20
Buenos Ayres 25 cs. 270

**Photographic Chemicals—**
Auckland 5 cs. £120

**Pyridine—**
Bremen 4 t. 12 c. £500

**Saccharum—**
Sydney 9 t. 1 c. £196

**Salammoniac—**
Taganrog 0 t. 14 c. £22
Bourgas 0 12 19
Lisbon 1 0 31

**Saltpetre—**
Valencia 0 t. 15 c. £16
Lyttleton 0 5 6
Wellington 0 10 12
Gibraltar 5 0 108
Rio Janeiro 6 7 143
Natal 0 15 17
Melbourne 5 15 119
Newcastle 1 0 22

**Salts of Lime—**
New York 10 cks. £112

**Sheep Dip—**
Algoa Bay 100 dms. £32
Natal 2 t. 10 c. 140
,, 300 dms. 5 cs. 84

**Sheep Wash—**
Hobart 4 cks. £19
Kingston, Ja. 66 dms. 30

**Silicate of Soda—**
Melbourne 5 t. 4 c. £28

**Soda Ash—**
Melbourne 30 t. 1 c. £200

**Soda Crystals—**
Sydney 79 t. 4 c. £189
Hamburg 8 3 20
Townsville 8 0 20

**Strontia Nitrate—**
Boston 1 t. 5 c. £36

**Sulphate of Ammonia—**
Demerara 49 t. 5 c. £606
Hobart 5 0 65
Barbadoes 25 0 310
Gothenburg 25 0 306
Trinidad 60 0 740
Hamburg 600 bags. 700

**Sulphate of Copper—**
Canterbury 2 t. 0 c. £45
Rouen 21 9 423
Sydney 2 0 44
Lyttleton 1 0 24
Paris 5 0 100

**Sulphate of Soda—**
Ghent 41 t. £41

**Sulphur—**
Sydney 53 cks. £41
Madeira 7 t. 7 c. 8
,, 30 brls. 22
Newcastle 7 t. 66

**Sulphur (flowers)—**
Madeira 3 t. 14 c. £40

**Sulphuric Acid—**
Natal 50 cs. £59

**Tartaric Acid—**
Monte Video 1 ck. £45
Sydney 3 t. 515
Wellington 12 c. 87
Lyttleton 10 90
Canterbury 10 91
Rosario 1 ck. 20
Brisbane 10 kgs. 82
Newcastle 2 c. 17
Calcutta 8 cs. 64

**Tin Crystals—**
Barbadoes 1 t. 2 c. £119

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# LIVERPOOL.

*Week ending April 11th.*

**Alum—**
Syra 3 t. 0 c. 0 q. £15
Rosario 1 3 0 6
Santander 4 19 0 23
Buenos Ayres 5 11 0 17
Ibrail 5 16 1 31
Constantinople 3 16 0 18
Fairwater 10 5 0 60

**Alumina Sulphate—**
Monte Video 20 t. 2 c. 1 q. £90
Santander 1 2 0 6
Boston 4 16 0 20

**Ammonia (carbonate)—**
Genoa 12 c. 1 q. £23
Ibrail 5 3 11

**Ammonia (liquid)—**
Vera Cruz 6 c. £11
Rosario 2 8

**Ammonia (muriate)—**
New York 5 t. 4 c. £126

**Ammonia (sulphate)—**
Bordeaux 50 t. 10 c. 0 q. £606
Barcelona 5 13 2 73
Honolulu 3 0 0 39

**Antiseptic—**
Genoa 1 t. 8 c. £6

**Arseniate of Soda—**
Bombay 11 c. £7

**Arsenic Acid—**
New York 6 t. £51

**Barytes—**
New York 110 t. £110

**Bauxite—**
Philadelphia 4 t. 6 c. £10

**Bicarbonate of Soda—**
Beyrout 20 kgs.
Constantinople 100 ,,
Hamburg 100 ,,
Naples 240 ,,
Rouen 50 ,,
Seville 75 ,, 12 brls.

**Binarsenate of Soda—**
Lisbon 14 c. £12

**Bleaching Powder—**
Baltimore 239 cks.
Boca 14 brls.
Boston 546 cks. 200 tcs.
Genoa 60 ,,
Havana 4 ,,
Messina 6 ,,
New York 204 ,,

## CHEMICAL EXPORTS—*Continued.*

**Bleaching Powder**—*continued.*

| | | |
|---|---|---|
| Palermo | 29 cks. | |
| Rouen | 28 ,, | |
| Stettin | 16 ,, | |
| Venice | 10 ,, | |

**Bone Meal**—

| | | |
|---|---|---|
| Honolulu | 6 t. | £46 |

**Borax**—

| | | |
|---|---|---|
| New York | 37 t. 10 c. 0 q. | £1,162 |
| Callao | 0 4 2 | 7 |
| Stettin | 3 cks. | 29 |
| Rotterdam | 8 t. 4 c. 0 q. | 110 |
| Hamburg | 1 1 0 | 32 |
| Seville | 0 15 2 | 24 |
| Portland, Me. | 0 3 0 | 8 |

**Brimstone**—

| | | |
|---|---|---|
| Demerara | 8 t. 0 c. 0 q. | £10 |
| Calcutta | 7 16 1 | 36 |

**Carbolic Acid**—

| | | |
|---|---|---|
| Genoa | 0 t. 6 c. 3 q. | £42 |
| New York | 12 14 2 | 1,280 |
| Marseilles | 6 1 0 | 90 |
| Boston | 0 17 0 | 84 |
| Halifax | 0 10 0 | 38 |
| Havre | 9 7 0 | 135 |

**Carbolic Fluid**—

| | | |
|---|---|---|
| Bombay | 3 c. 2 q. | £5 |

**Carbolic Powder**—

| | | |
|---|---|---|
| Hamburg | 2 t. 18 c. 1 q. | £408 |
| Alexandria | 1 3 0 | 5 |

**Carbolic (solid and crystals)**—

| | | |
|---|---|---|
| Rouen | 1 t. 6 c. 0 q. | £132 |
| Montreal | 0 4 3 | 15 |
| Baltimore | 4 18 1 | 638 |

**Carbolic Disinfectant**—

| | | |
|---|---|---|
| Baltimore | 1 t. 6 c. 0 q. | £70 |
| Calcutta | 0 3 0 | 40 |
| Shanghai | 0 2 2 | 14 |

**Caustic Potash**—

| | | |
|---|---|---|
| New York | 9 t. 19 c. 2 q. | £201 |
| Bombay | 1 18 0 | 54 |
| Baltimore | 10 8 0 | 208 |

**Caustic Soda**—

| | | |
|---|---|---|
| Algiers | 5 dms. | |
| Alicante | 34 ,, | 24 brls. |
| Amsterdam | 10 ,, | 40 kgs. |
| Bahia | 15 ,, | |
| Baltimore | 250 ,, | |
| Barcelona | 2 ,, | 25 brls. |
| Bari | 20 ,, | |
| Beyrout | 5 ,, | |
| Bilbao | 90 ,, | 45 brls. |
| Boca | 200 ,, | |
| Boston | 600 ,, | |
| Carthagena | 18 ,, | |
| Ceara | 20 ,, | |
| Galatz | 20 ,, | |
| Hamburg | 10 ,, | |
| Havana | 30 ,, | |
| Huelva | 7 ,, | |
| Marseilles | 40 ,, | |
| Newfairwater | 68 ,, | |
| Parnahiba | 10 ,, | |
| Philadelphia | 100 ,, | |
| Rio de Janiero | 19 ,, | |
| Rotterdam | 10 ,, | 20 bxs. |
| Rouen | 146 ,, | |
| Santander | 44 ,, | 28 brls. |
| Seville | 150 kgs 782 ,, | 70 ,, |
| Singapore | 12 ,, | |
| Sydney | 72 ,, | |
| Tarragona | ... | 20 brls. |
| Valencia | 30 ,, | |
| Vera Cruz | 15 ,, | |
| Vigo | 12 ,, | |

**Charcoal**—

| | | |
|---|---|---|
| Nantes | 125 t. | £500 |

**Charcoal Refuse**—

| | | |
|---|---|---|
| St. Nazaire | 65 t. 17 c. | £223 |

**Chemicals** *(otherwise undescribed)*—

| | | |
|---|---|---|
| Naples | 2 t. 4 c 3 q. | £68 |
| Bari | 0 10 1 | 15 |
| Odessa | 7 9 3 | 249 |
| Halifax | 0 8 0 | 120 |
| Hamburg | 30 5 2 | 908 |
| Antwerp | 23 16 2 | 715 |
| Rio de Janeiro | 0 3 3 | 6 |

**Chlorate of Potash**—

| | | |
|---|---|---|
| New York | 17 t. 10 c. 2 q. | £964 |
| Barcelona | 0 10 0 | 26 |
| Buenos Ayres | 1 10 0 | 84 |
| Stettin | 5 0 0 | 280 |
| Rotterdam | 16 0 0 | 872 |
| Hamburg | 0 10 0 | 29 |
| Gothenburg | 8 0 0 | 447 |
| Naples | 1 0 0 | 54 |
| Genoa | 0 10 0 | 25 |
| Venice | 3 17 2 | 220 |

**Chloride of Calcium**—

| | | |
|---|---|---|
| New York | 15 t. | £26 |
| Boston | 10 | 20 |

**Cobalt Oxide**—

| | | |
|---|---|---|
| Genoa | 200 lb. | £100 |

**Copperas**—

| | | |
|---|---|---|
| Constantinople | 3 t. 15 c. qr. | £60 |
| Smyrna | 6 5 1 | 11 |

**Copper Precipitate**—

| | | |
|---|---|---|
| Naples | 19 t. 10 c. | £1,330 |

**Copper Sulphate**—

| | | |
|---|---|---|
| Antwerp | 1 t. 5 c. 3 q. | £25 |
| Iquique | 11 4 1 | 215 |
| Venice | 1 3 1 | 27 |
| Rouen | 11 10 0 | 216 |
| Bordeaux | 99 13 0 | 1,686 |

**Cream Tartar**—

| | | |
|---|---|---|
| Halifax | 1 t. 13 c. 2 q. | £197 |
| Charlottetown | 0 3 3 | 24 |
| Calcutta | 0 3 0 | 23 |
| Belize | 1 brl. | 13 |

**Disinfectants**—

| | | |
|---|---|---|
| Bombay | 5 t. 17 c. 3 q. | £54 |

**Epsom Salts**—

| | | |
|---|---|---|
| Rio de Janiero | 80 kgs. | |
| Leghorn | 10 t. | £80 |

**Glycerine**—

| | | |
|---|---|---|
| Vera Cruz | 0 t. 3 c. 2 q. | £14 |
| Rouen | 5 1 0 | 253 |

**Guano**—

| | | |
|---|---|---|
| Cullera | 200 t. | £1,650 |

**Horn Waste**—

| | | |
|---|---|---|
| Genoa | 2 t. | £18 |

**Iron Oxide**—

| | | |
|---|---|---|
| Rouen | 2 t. 3 c. | £15 |
| Halifax | 3 0 | 19 |

**Iron Sulphide**—

| | | |
|---|---|---|
| Rosario | 5 t. | £10 |

**Leather Waste**—

| | | |
|---|---|---|
| Havre | 4 t. 14 c. | £50 |

**Magnesia**—

| | | |
|---|---|---|
| Melbourne | 20 cs. | |

**Magnesia Sulphate**—

| | | |
|---|---|---|
| Vigo | 1 t. 2 q. | £10 |

**Magnesium Chloride**—

| | | |
|---|---|---|
| Rangoon | 0 t. 9 c. 3 q. | £7 |
| Rouen | 5 14 0 | 13 |

**Manure**—

| | | |
|---|---|---|
| Havre | 236 t. 12 c. 1 q. | £1,226 |
| Nantes | 4 10 0 | 15 |

**Manure**—*continued.*

| | | |
|---|---|---|
| Demerara | 50 t. 0 c. 0 q. | £537 |
| Bordeaux | 200 15 3 | 921 |
| P. Edward Island | 23 10 0 | 76 |
| Honolulu | 6 0 0 | 31 |
| Rosario | 1 2 1 | 12 |
| Hamburg | 10 0 0 | 60 |
| Teneriffe | 1 16 0 | 7 |

**Oxalate of Potash**—

| | | |
|---|---|---|
| Barcelona | 1 t. | £35 |

**Oxalic Acid**—

| | | |
|---|---|---|
| Lisbon | 2 t. 1 c. | £62 |

**Phosphorus**—

| | | |
|---|---|---|
| Vera Cruz | 7 c. 3 q. | £60 |

**Picric Crystals**—

| | | |
|---|---|---|
| Hamburg | 2 t. 15 c. 1 q. | £427 |

**Potashes**—

| | | |
|---|---|---|
| Catania | 14 t. 7 c. 1 q. | £341 |
| Oporto | 1 14 3 | 42 |

**Potassium Bichromate**—

| | | |
|---|---|---|
| Rouen | 20 t. 14 c. | £688 |
| Havre | 11 5 | 340 |

**Potassium Carbonate**—

| | | |
|---|---|---|
| Baltimore | 1 t. 15 c. | £31 |

**Potassium Cyanide**—

| | | |
|---|---|---|
| Axim | 5 c. | £25 |

**Potassium Sulphate**—

| | | |
|---|---|---|
| Las Palmas | 0 t. 12 c. | £17 |
| Honolulu | 3 0 | 30 |

**Prussiate of Potash**—

| | | |
|---|---|---|
| Valencia | 0 t. 8 c. 0 q. | £26 |
| Naples | 0 5 0 | 19 |
| Bombay | 0 5 0 | 18 |
| Rouen | 5 7 1 | 275 |

**Salammoniac**—

| | | |
|---|---|---|
| Naples | 1 t. 15 c. 0 q. | £57 |
| Galatz | 0 5 3 | 9 |

**Salt**—

| | | |
|---|---|---|
| Akassa | 61 tons. | |
| Amsterdam | 256 ,, | |
| Antwerp | 90 ,, | |
| Baltimore | 200 ,, | |
| Barbadoes | 50 ,, | |
| Boca | 27 ,, | |
| Boston | 100 ,, | |
| C. C. Castle | 26 ,, | |
| Charlottetown | 20 ,, | |
| Chicago | 187 ,, | |
| Halifax | 1,177 ,, | |
| Iceland | 370 ,, | |
| Manaos | 7 ,, | |
| New York | 151 ,, | |
| Para | 50 ,, | |
| Philadelphia | 30 ,, | |
| Pillau | 928 ,, | |
| Rotterdam | 235 ,, | |
| Rouen | 20 ,, | |
| St. John, N.B. | 200 ,, | |
| San Francisco | 30 ,, | |
| Talcahuano | 45 ,, | |
| Victoria | 2 ,, | |

**Saltcake**—

| | | |
|---|---|---|
| Baltimore | 174 t. 6 c. | £328 |

**Saltpetre**—

| | | |
|---|---|---|
| Newport News | 9t. 18 c. 0 q. | £205 |
| Callao | 0 12 2 | 13 |
| Carthagena (Spain) | 5 0 3 | 81 |
| Santa Catharina | 0 10 0 | 11 |
| Rio de Janeiro | 0 18 0 | 20 |
| Vera Cruz | 4 0 1 | 86 |
| Para | 0 10 0 | 11 |

**Sheep Dip**—

| | | |
|---|---|---|
| Portland, O. | 20 t. | £1,000 |

## CHEMICAL EXPORTS—*Continued.*

**Silicate of Soda—**
Vigo 6 brls.

**Soap Lyes—**
Rotterdam 3 t. 14 c. £72

**Soap Powder—**
Hamburg 4 c. £7

**Soda Ash—**
Alicante 6 cks.
Baltimore 731 ,, 132 tcs.
Barcelona 40 brls.
Bari 71 ,,
Boca 120 cks.
Boston 131 ,,
Buenos Ayres 100 brls.
Ghent 66 cks.
Melbourne 205 brls.
Newport News 115 tcs.
New York 500 cks.
Oporto 12 brls.
Parnahiba 20 ,,
Philadelphia 82 cks. 442 tcs.
Portland 72 ,,
Porto Alegre 40 brls.
Rouen 40 ,,
St. John, N.B. 30 tcs.
Seville 12 brls.
Smyrna 150 ,,

**Soda Crystals—**
Boston 420 brls.
Demerara 30 ,,
Gibraltar 20 cks.
Melbourne 108 brls.
Monte Video 15 cks.

**Sodium Nitrate—**
Oporto 1 t. 0 c. 2 q. £11
Malaga 3 16 2 41

**Sodium Sulphite—**
Boston 4 c. 1 q. £10

**Sulphate of Lime—**
Santander 5 t. £10

**Sulphur—**
Demerara 3 t. 0 c. £18
Carril 1 0 9
Pernambuco 1 14 11

**Sulphuric Acid—**
Monte Video 80 gals. £20

**Tannic Acid—**
Lisbon 3 c. £22

**Yellow Oxide—**
Hamburg 5 t. £20

**Zinc Chloride—**
Bombay 7 t. 6 c. 2 q. £109
Rotterdam 5 8 0 36
Genoa 1 1 2 9

## GLASGOW.

*Week ending April 14th*

**Bichromate of Potash—**
Boston 4 t. 13 c. £180

**Bichromate of Soda—**
Boston 4 t. 12 c. £139

**Carbolic Crystals—**
Boston 5 c. £30

**Copperas—**
Kurrachee 23 t. 10 c. £70

**Manure—**
Antwerp 7 t. £50
Trinidad 102 t. 11 c. 946
Demerara 143 19 1,428
Christiania 250 bags. 63

**Nitrate of Soda—**
Christiania 32 bags. £40

**Nitric Acid—**
Adelaide 1 t. £15

**Pitch—**
Chili 28 t. 19 c. £100
Sables d'Olonne 642 t. 6 c. 500

**Potassium Prussiate—**
New York 4 t. 18 c. £270
Christiania 1 ck. 33

**Soda Ash—**
Circassia 41 t. 2 c. £175

**Stannous Chloride—**
Trinidad 20 cases. £93

**Sugar of Lead**
Bombay 1 t. 7 c. £37

**Sulphate of Ammonia—**
Trinidad 261 t. £3,300
Demerara 235 t. 12 c. 2,870
Christiania 10 bags. 12

**Sulphur—**
Kurrachee 7 t. 18 c. £60

**Sulphuric Acid—**
Rangoon 3 t. 7 c. £36
Kurrachee 13 14 68

**Tin Crystals—**
Bombay 8 c. £26

## HULL.

*Week ending April 10th.*

**Alkali—**
Bergen 10 cks.

**Bleaching Powder—**
Christiania 96 cks.
Drontheim 78 ,,
Rouen 24 ,,

**Chemicals** *(otherwise undescribed)*
Antwerp 2 cs. 5 cks.
Amsterdam 7 ,, 20 ,,
Bergen ... 161 ,,
Copenhagen 2 ,,
Christiania 6 ,, 1 ,,
Gothenburg 8 ,, 42 ,, 60 pkgs.
Ghent ... ... 1 pkg.
Hamburg 24 ,, 114 ,,
Libau ... 12 ,,
New York 55 ,,
Odessa ... 171 ,,
Rotterdam 2 ,, 74 ,, 100 pkgs.
Rouen ... 25 ,,

**Manure—**
Antwerp 676 bags.
Copenhagen 34 tons.
Drontheim 100 bags.
Dunkirk 764 ,,
Esbjerg 156 tons.
Ghent 1,571 bags.
Hamburg 533 ,,
Rotterdam 47 ,,

**Pitch—**
Antwerp 1,028 tons.

**Tar—**
Hamburg 21 cks.

## TYNE.

*Week ending April 14th.*

**Alkali—**
Antwerp 6 t. 11 c.
Hamburg 16 3

**Alkali—***continued.*
Rotterdam 8 t. 1 c.
Copenhagen 22 9
Venice 3 4

**Alum—**
Ancona 3 t. 7 c.

**Aluminium Sulphate—**
Rouen 8 c. 2 q.

**Arsenic—**
Venice 2 t. 10 c.

**Barium Carbonate—**
Rouen 60 t.

**Barium Chloride—**
Rouen 10 t. 6c.

**Barium Nitrate—**
Rouen 57 c.

**Barytes—**
Rouen 25 t.

**Bicarbonate of Soda—**
Rouen 1 t. 19 c.
Hamburg 1 0
Ancona 0 11
Rotterdam 1 7

**Bleaching Powder—**
Venice 16 t. 10 c.
Hamburg 48 10
Ancona 5 14
Trouville 0 11
Antwerp 54 2
Lisbon 15 6
Rotterdam 26 9
Copenhagen 138 3
Ystad 2 8

**Caustic Soda—**
Copenhagen 1 t. 3 c.
Bilbao 3 10
Hamburg 2 16

**Iron Oxide—**
Pozzuoli 11 c.

**Lead Oxide—**
Lisbon 2 t. 2 c.

**Magnesium Hydrate—**
Rouen 2 q.

**Manure—**
Esbjerg 5 t. 18 c.
Lisbon 0 2

**Potassium Chlorate—**
Antwerp 1 t. 10 c.

**Soda—**
Bilbao 5 t.
Hamburg 20 5 c.
Ancona 40 18
Alexandria 4 0
Esbjerg 6 0
Rotterdam 61 14
Bergen 1 6
Venice 23 11
Drontheim 3 6
Ystad 96 8

**Soda Ash—**
Venice 41 t.
Ancona 11 3 c.
Esbjerg 6 8
Lisbon 41 11
Rotterdam 8 9
Copenhagen 21 0
Venice 67 5

**Sodium Sulphate—**
Esbjerb 6 t. 10 c.

**Sodium Chlorate—**
Rotterdam 21 c. 3 q.

# PRICES CURRENT.

[THURSDAY, April 19, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 9 | 0 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... ... ... ... ... per lb. | 0 | 0 | 6 |
| Fluoric ... ... ... ... ... ... ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ... ,, | 0 | 0 | 3½ |
| Picric ... ... ... ... ... ... ... ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) ... ... ... per ton | 15 | 0 | 0 |
| ,, (monohydrate) ... ... ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ... ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) ... ... ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ... ,, | 0 | 1 | 6 |
| Arsenic, white powdered... ... ... ... per ton | 11 | 7 | 6 |
| Alum (loose lump) ... ... ... ... ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, 880=28°... ... ... ... ... per lb. | 0 | 0 | 3⅛ |
| ,, =24°... ... ... ... ... ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3⅛ |
| ,, Muriate ... ... ... ... ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 45 | 0 | 0 |
| ,, ,, (pure) ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 12 | 2 | 6 |
| ,, ,, (grey), Hull ... ... ,, | 12 | 0 | 0 |
| Aniline Oil (pure) ... ... ... ... ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ... ... ... ... ,, | 0 | 0 | 8½ |
| Antimony ... ... ... ... ... ... ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... ... ... ... ... per ton | 7 | 10 | 0 |
| ,, Carbonate (native) ... ... ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 8 | 9 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 11 | 17 | 6 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ... ...per gallon | 0 | 3 | 4 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 2½ |
| ,, (crude 60°) ... ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 1 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 80 | 2 | 6 |
| ,, Sulphate ... ... ... ... ... ,, | 21 | 0 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 80 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... ,, | 15 | 5 | 0 |
| ,, Litharge Flake (ex ship) ... ... ,, | 16 | 5 | 0 |
| ,, Acetate (white, ,, ) ... ... ,, | 26 | 5 | 0 |
| ,, ,, (brown, ,, ) ... ... ,, | 21 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 10 | 0 |
| ,, Nitrate ... ... ... ... ... ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 9 | 0 | 0 |
| ,, ,, (grey) ... ... ... ... ,, | 13 | 7 | 6 |
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | 3 |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ... ... ... ,, | 17 | 10 | 0 |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ... ... ...per gallon | 0 | 2 | 1 |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 4 | 0 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 6 |
| **Oils:—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 3 | 0 |
| Cotton-seed ... ... ... ... ... ... per ton | 21 | 0 | 0 |
| Linseed ... ... ... ... ... ... ... ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ... ... ...per gallon | 0 | 0 | 6 |
| ,, American ... ... ... ... ,, | 0 | 0 | 6½ |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... ... ... per cwt. | 0 | 16 | 6 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 5½ |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | 6 |
| ,, Permanganate ... ... ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | 6 |
| ,, Sulphate, 90 % ... ... ... per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % ... ... ... ,, | 8 | 10 | 0 |
| Silver (metal) ... ... ... ... ... ... per oz. | 0 | 3 | 7½ |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | 7½ |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 10 | 0 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ... ... ,, | 19 | 10 | 0 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... ... ... ... per ton. | 30 | 0 | 0 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda)... per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 5 | 0 |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 12 | 6 |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 5 | 0 |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 ... ... ... ,, | 10 | 0 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 | 3 |
| ,, Nitrite, 98% ... ... ... ... per ton | 28 | 0 | 0 |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 7 | 6 |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 0 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 10 | 0 |
| ,, Sulphide ... ... ... ... ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 14 | 0 |
| ,, Cane ... ... ... ... ... ... ,, | 0 | 16 | 0 |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | 6 |
| ,, Barium ... ... ... ... ,, | 0 | 0 | 6 |
| ,, Copper, 60% ... ... ... ,, | 0 | 0 | 6 |
| Sulphur (Flowers) ... ... ... ... ... per ton | 9 | 0 | 0 |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 5 | 0 |
| Tallow ... ... ... ... ... ... ... ,, | 26 | 0 | 0 |
| Tin (metal) ... ... ... ... ... ... ,, | 158 | 0 | 0 |
| ,, Crystals ... ... ... ... ... per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 17 | 10 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 15 | 0 |

# The Chemical Trade Journal,

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**SATURDAY, April 28, 1888.**


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## THE PRESENT STATE OF THE LAW CONCERNING THE POLLUTION OF AIR AND WATER.


BY ALFRED E. FLETCHER, F.C.S., F.I.C.,

H.M. Chief Inspector under the Alkali, etc., Works Regulation Act.


WE all resent the interference of law; it comes as a restraint on our freedom. We prefer to think that our actions are so well regulated as to need no guidance from others. It would, indeed, be well if this were always so, but, unfortunately, the pressure of a present necessity, and a disproportionate view of self-interest, often distort the judgment, so that the constraint of law becomes necessary to prevent one man from trenching on the freedom of others while claiming to exercise his own. As men crowd more and more together, regulations as to possible pollution of air and of water become of the greatest importance. The early settler in a new country, whose nearest neighbour is twenty miles away from him, may do much in the way of polluting both air and water without injuring anyone. The fresh winds of heaven and the waters of the swiftly flowing river soon dissipate the impurity which he may have introduced. As population, however, increases, and when, as is the case in London, a mass of four million people is aggregated on the area of a small county; or when twenty large chemical works are crowded into the space of a square mile, whence the smoke and acid gases resulting from the combustion of 5,000 tons of coal are daily poured into the air; or where the banks of a stream are lined for many consecutive miles with dye and other works which discharge their dirty water into the once clear river, then indeed the balance is reversed. The land is small but the people are many, and it behoves every one to see that he sends away nothing into the air above him, nor into the water below, which shall interfere with the free use by his neighbour of these elements so essential to us all.

Unfortunately, however, we cannot help using, and to a certain extent using up and spoiling, these two essentials of our life, air and water. The manufacturer who carries on processes by which are produced some of the numberless articles which minister to our comfort, cannot wholly avoid sending into the air or the running stream some matter which is calculated to interfere with its purity. Therefore the law cannot step in, and with heavy hand put a stop to all such pollutions; it can only mitigate and set some limit to the evil, the existence of which it cannot but recognise.

It will be my object now to show what the law has done in this direction, and also to point out what may still be hoped for from its further action.

Firstly, as regards the pollution of the air.

In order to study well this portion of our subject, I must ask you, in imagination, to follow me into some of the more manufacturing districts of our country. We might visit some of the valleys in South Wales, where copper, zinc, lead, and iron, with silver, gold, and other metals are extracted from their ores. We should there see vast clouds of sulphurous acid, together with the oxides of arsenic, lead, zinc, and the more volatile metals, issuing from numberless chimneys and floating into the air; we should perceive the greasy odour of the hot oil of the tinplate works meeting us in the breeze, and the stinging smell of the patent fuel works, where those useful blocks of compressed coal are made which help to carry our ships across the seas. The streams of water have not escaped; they are no longer clear and bright as of yore, but are laden with a yellow stain, an ochry liquid from the tinplate works, caused by the acid rinsing of the plates, necessary for the removal of all tarnish before they are plunged into the melted tin.

You look from this to the hill sides, to the margins of the valleys where these various works are situated; these once were green and clothed with beech and drooping ash—now all is bleak and bare. No leaf stirs in the evening air; the underwood, the shrubs, the very grass is gone, and with the grass, the soil; for when the fibrous roots no longer hold it, the rain washes it down the steep slopes, and nothing remains but the bare rock or gravel; this latter not so neat and trim as the navvy would leave it, as on the side of yonder railway bank, but scored deep by the rain which, now unrestrained by root or fibre, and held back by the spongy soil, rushes down in torrents after every shower, scoring deep gullies in its downward course. Or we will visit a place or two in Lancashire where chemical works are found, perhaps twenty massed together in one spot and some occupying as much as

twenty acres of land. In more than one such manufacturing centre about 4,000 tons of coal are burnt in a day, yielding to the air no less than 120 tons of sulphurous acid every twenty-four hours. To this is added a certain amount of hydrochloric acid, nitrous acid, chlorine, and sulphuretted hydrogen, all of which, but for the firm repression of the law, would reach very large proportions. Here, too, the vegetation suffers greatly, the trees of the nearer land have disappeared, and all within a distance of three miles have suffered heavily. To give an illustration of the extent to which the principal of these chemical trades, the soda manufacture, is carried on, I may say that at one of the places where it prevails, namely, at Widnes, in Lancashire, a waste product, called alkali waste, which is thrown out from the works, has accumulated within the last twenty-five years to such an extent that now 680 acres of land are covered with it, to a thickness varying from 8 to 25 feet, and amounting to about 9,000,000 tons. This material contains about 15 per cent. of sulphur, and, unless most carefully dealt with, is a constant source of sulphuretted hydrogen.

Or we might visit districts in Staffordshire, Yorkshire, Durham, or in Scotland, where the iron manufacture is largely carried on in its various branches, and we should stand aghast at the sight of the vast volumes of dense and acid coal smoke that is thrown off, filling the landscape with its grimy haze. Doubtless we should be struck on observing a great irregularity as to this, and wonder that, if some manufacturers have done so much to restrict the emission of black smoke, others should have done so little.

Some districts in Scotland should also be visited, where a coaly shale is distilled in order to produce the paraffin oil we burn; there the peculiar odour that characterises the trade and a black acid smoke would arrest our attention, and there, too, we should notice the injury that has been done to the surrounding vegetation.

I will not take you further; enough has been shown to prove the great extent of air pollution which attends the larger manufacturing operations of our country; let us see what the law has done, and what it can do, to restrain, and if possible, to diminish it.

There was a time when men thought less of the products of such manufacturing work as we have been considering than they do now. They were satisfied with the produce of the farm, made up for their use by such hand labour as could be spared from the plough and the sickle. With bread to eat and homespun cloth to wear men were content. We now demand much more; our paper and our linen must be white, and for this purpose must be produced chlorine, a noxious gas, dangerous to both animal and vegetable life if allowed to escape Our clothes must be dyed of various colours, the result of intricate chemical processes, during the conduct of which many noxious gases are evolved. We demand a liberal supply of iron, copper, tin, lead, and other metals; these must be extracted from their ores and purified by various smelting and other processes, during which, as has already been said, much destructive gas is thrown into the air. Indeed, almost all the good things we enjoy, the clothes we wear, the houses we live in, and much of the food we eat, are the outcome of some manufacturing process, during the progress of which smoke or vapour is discharged, to the detriment of the air we breathe. Shall we, then, stop all this work, and, clothed in skins and such rough garments as may have sufficed for our savage ancestors, at once gain repose and a clear atmosphere? Few, indeed, would counsel such a course; rather would we strive to elaborate as much as is possible from the materials nature has given us, striving the while to carry on our industry with such added skill as shall, as far as possible, diminish the evils liable to accompany it.

If we compare two manufacturers we may find a considerable difference in their methods of conducting the same process. Greater skill in the arrangement of apparatus, greater care in carrying on the work, a more thorough knowledge of the business in hand, will enable one more fully to prevent the escape of noxious gases, and in general to conduct his work so as to cause less nuisance than does his neighbour. Seeing this difference, the law has stepped in, and says that whatever can be done to prevent the escape of noxious gases must be done, and holds a man answerable for the result of negligence or ignorance. The law does not peremptorily forbid all escape of noxious gas, but it forbids under heavy penalties the escape of any which our present knowledge would enable us to retain.

The works first subject to legal enactment as regards the emission of noxious gases were those engaged in the soda manufacture. These works are not found distributed thr out the country, but they are collected in a few dis The principal places are St. Helens and Widnes in L shire, Newcastle and the Tyneside, and Glasgow. The also isolated works in East Lancashire and Yorkshire Birmingham and Bristol, and in North Wales.

Soda, in the various forms under which it is offe commerce, is obtained from common salt. This sub is, in the first instance, decomposed by the action phuric acid, hydrochloric acid gas being disengaged. earlier days of the manufacture, this acid gas was allo escape into the air, care being taken to pass it into a ch with a good draught, in order that it might be carried so as not to inconvenience the workpeople. From the ney it descended on the country round, killing all tre herbage within its reach.

Soon means were found for absorbing this gas in and thus arresting the escape of the hurtful vapour. was effected with great care by some of the manufact but less completely by others. It was at this point th law stepped in. In 1863, the first Alkali Act was pass was enacted that all alkali manufacturers must conde least 95 per cent of their hydrochloric acid under the penalty of £50 for the first, and a £100 for a subs offence. To administer the Act, an inspector and inspectors were appointed, who had the right of entry works.

It may be said that in this the law made a great upon private rights; a man's house is his castle, an his factory, and who shall enter without his consent? but here we have an exceptional case. Usually the w of the common law is sufficient, and it is often said t every wrong a man can suffer he has a legal remedy examination, however, it will be found that this case an exception to the general rule. As has already been the chemical works referred to are found often in g This alone makes it difficult for a sufferer to single o one from which he has received his injury. It ma been done by any one of them, or all may have contr to produce it. Whom shall he sue for damages?

Let us imagine a group of chemical works, there twelve or twenty of them, from which acid vapou either constantly or occasionally emitted. A farme distance of half a mile finds his crops injured when th blows from the direction of the works on to his land oats or his wheat are growing well, they commence to and all promises fairly for an abundant crop, when change of wind! the unwelcome "*chemic*" blows ove and in a few hours he knows, by the sickly tinge of widespread over the fields, that all hope of a plentif is gone; the plants have been attacked at the most period of their growth, and if they survive at all the will be disappointment, and the harvest a failure. this, he calculates the amount of damage he has sus and with the aid perhaps of a professional valuer, est in money the amount by which he will be the poorer injury the chemical vapours have done him. He go to the nearest of his chemical neighbours, and with s of the damaged plants in his hand makes applicati compensation. The manufacturer, on hearing his stat expresses his sympathy with the farmer, and explains the careful arrangements he himself has made to prev escape of acid and hurtful gases from his works. H takes the farmer round and shows him the clever app whereby all such nuisances are rendered impossible. farmer looks with rueful eye at his handful of wi plants, and holding them up as evidence asks, "The was all this done?" The reply is promptly given, effect that as the gas must have come from somewhe could not have come from these works, it probabl ceeded from some of his less skilful or careful neigh The farmer's heart now fails him. He sees that this given by one will be repeated by all, and that it is imp for him to discover who has done him the injury. P several have contributed towards it.

In the case here described the farmer is the suffere the conditions may be reversed, and the careful and s ful manufacturer may be placed in that position unfair application of the farmer.

As before, let us suppose a group of chemical wor these very different from one another in their manag although the main processes carried on in them similar, in that gases are generated or dealt with, w allowed to escape, would injure the neighbouring vege yet in some of these works careful and enterprising me

brought the operations so much under control that no noxious gases escape, and no air pollution is caused by them. In a neighbouring factory, however, the managers and workmen are notoriously slovenly and careless, so that the place is a very fountain of impurity, a source from which injury may at any moment flow out over the country round. The farmer whose crops are damaged can, however, make no distinction. To him chemical works are all alike—places that he would willingly consign to oblivion. He, walking in his fields one evening, sees the smoke of the neighbouring factories pouring down his way, and calls his man to notice that the wind just then is bringing that of one of the more conspicuous works directly over his land. In the course of the night a slight shift of wind brings the smoke from another of the works across the field, and while that is so, a violent discharge of acid takes place. This injures the crops of growing corn, etc., so that in the morning the effect is plainly visible. The farmer now makes his claim against the chemical works first mentioned, the smoke from which he had noticed to be blowing over his land. He and his man saw the smoke advance from the chimney and sweep over his farm. In the morning he observed the fatal result on his growing crops. The evidence appears to be complete, and the farmer gains his case in court, obtaining heavy damages, the full anticipated value of his crop.

In this case the manufacturer was wronged; in the previous case, as described, the farmer was wronged. How can justice be done between these conflicting interests? The common law evidently does not meet the difficulty.

Consider also another case. The proprietor of an ancient estate, handed down to him through many generations, resides in his baronial mansion, nestling in wooden hills and surrounded by a well-timbered park, the pride of the county. The neighbouring town becomes a centre of chemical activity, large factories are built, much sulphurous coal is burnt, and the impartial wind carries the acid smoke to the neighbouring park, where it soon makes its mark, shrivelling the leaves, destroying the topmost branches of the trees working its way through the shrubberies, till tree after tree succumbs, and the ancestral mansion stands agape at the bare hillsides, till lately covered with stately oaks and branching elms.

The common law says that for every wrong there is a remedy, but what remedy can it give in a case such as this? To pay the proprietor the money value of his trees would be but to add an insult to the injury he has sustained in seeing his priceless acres denuded of their beauty. Even this money compensation would be hard to obtain in the case supposed where a large number of manufacturers and others have contributed to the damage.

In the cases now cited it is obvious the common law does not provide a remedy, hence the need of fresh legislation suited to the emergency.

Great doubt was felt as to how this new Alkali Act would work. A principle strange to British ideas was introduced. Could it be tolerated that an inspector should have the right of entrance to a man's premises by day and by night to ascertain what was going on? Doubtless the position was critical, and made great demand on the inspector's tact and wisdom. He had, however, this to support him: the foremost manufacturers were those who had done most to guard against the emission of noxious vapours, and they were not unwilling that this should be generally known. They also suspected that some of the neighbouring manufacturers were not as careful as they should be, and that they were suffering in part for their neighbours' sins. Thus the inspector found with the foremost manufacturers a welcome and general assistance in his work beyond that which might at first have been anticipated. He was regarded also as a valuable aid to the manager in maintaining the discipline of the factory, and an additional check on the accuracy of the work carried on.

It has long been known that substances which to-day are regarded as waste products before long find a use, and cases could be quoted where that which was once considered as useless has in time become the main product of a process. It may at first sight appear that, where a substance has a recognised value, there is no longer need for an inspector to enforce its retention, and, when it occurs in the form of a gas, to prevent its being allowed to escape into the air. Even in such a case there is, however, still a need for his action, for there is often a margin, an unbridged space, between the distance a man will go prompted by self-interest and the distance prompted by duty. The paths may lie in the same direction, but they are not always co-terminous. Thus, to give an instance. By some mischance a bag of flour is brought into a room provided with a handsome carpet. It is upset, and spilt on the carpet. The owner of the flour proceeds to gather up his property, and, conscious of its value, leaves behind him as little of it as possible. He carries away all that he can conveniently collect, and is about to leave, when the owner of the carpet intervenes, and demands that a further process of removal shall be carried out—not now because of the value of the flour, but on account of the carpet, he demands that no trace of the white stain shall remain, that all shall be removed.

So it is with regard to the gas chlorine or hydrochloric acid, nitric acid, and the like. These have all a commercial value, and no manufacturer could afford to allow them continually to escape; yet a sudden flaw or breach might occur in some part of an apparatus through which one or other of these gases may leak away. If the quantity of material thus lost were not excessive, it might be wiser, commercially speaking, to suffer for a time the loss than to stop the plant and repair it. Or, again, an apparatus is arranged for the condensation and arrest of hydrochloric acid gas, and is so far successful that nine-tenths of that generated is collected and made useful. But how about the remaining tenth? The manufacturer says that it will not pay him to put up increased plant to arrest this remainder; the amount caught will not be commensurate with the cost of catching it; it will be better for him to let it go. Here, then, the inspector steps in and puts on pressure, and obliges him to go on further in the path he was travelling than he would voluntarily have gone.

Fortunately, men are generally rewarded for well doing, and the inspectors under the Alkali Act have often been thanked for insisting on improved methods of working, because in the end those have brought an unexpected benefit. Often have the inspectors been thanked by both masters and men for a change in a mode of operation, or in the construction of apparatus brought about by them, perhaps with considerable difficulty, and by the exercise of great moral pressure, extending even to the threat of legal action. One instance of this is so striking that I may be excused delaying a moment to give it. It is known to most that in the manufacture of bleaching powder chlorine gas is used in large quantities. It is made to flow through pipes into large chambers, on the floor of which lime has been spread. The lime absorbs the chlorine gas, and is thus converted into bleaching powder, every ton containing 7¼ cwt. of chlorine. It will be easily realised that, as the lime approaches saturation, the vigour with which it at first absorbed chlorine will diminish, and in the end it is likely that some of this gas will be left unabsorbed. In order now to pack the bleaching powder into casks, it is necessary that men should enter the chamber which has been till lately filled with chlorine; and that they may have air to breathe, and not be suffocated, the unabsorbed, the residual, chlorine must be removed. The easiest way of effecting this is to open the large doors of the chambers and allow the gas remaining in it to escape into the air. Many methods were suggested for preventing this source of nuisance, and dealing in some way with the residual chlorine referred to. The general feeling, however, was that the quantity was so small that it would not pay to deal further with it. Under the first Alkali Act, no power was given by which this state of things could be remedied, and the apathy remained. Under the more recent Alkali Act, which I will mention directly, power was given to control the emission of chlorine, and various methods were suggested by which the escape of this very noxious gas might be prevented, not for the sake of profit, but to avoid a nuisance. At length a method was perfected and adopted at one of the works. It was found to be so successful that not only was all the chlorine absorbed, but having the power of ending up the process when desired, the manufacturer found that he could work larger charges of material in the same apparatus in the same time. The result was that during the nine months following the adoption of the process referred to, 180 tons more bleaching powder were made than would otherwise have been the case, and the amount thus gained was £1,200. I bring this forward as an instance where a process was adopted under compulsion with a view to avoid a nuisance, but it ended in yielding a handsome reward. I may say, indeed, that results resembling this have followed constantly in the wake of improvements undertaken at the time with a view to prevent the escape of some noxious gas, but found ultimately to bring a reward with them.

The Alkali Act of 1863 introduced, as I have said, a new principle of legislation. By it power was given to anticipate,

with a view to prevent any injurious action, the emission of a noxious gas, rather than to exact compensation for an injury committed. But this principle was introduced tentatively; it applied to one acid gas only, and to that gas only when it was produced in one specified chemical process—the muriatic acid gas of the alkali works. All other chemical works in the country, and all other processes from which noxious vapours might arise were left untouched by the Act. In consequence of this limitation many curious anomalies arose. The muriatic acid generated in an alkali works must be condensed; if more than 5 per cent. of that generated was allowed to escape, the manufacturer became liable to a fine of £50 for the first offence, and £100 for the second; but if from a neighbouring factory, not an alkali works, the same acid escaped, the Act was inoperative, for the inspector had no power to interfere; or if from an alkali works any other acid than hydrochloric acid escaped, the inspector then could not interfere. And even closer than this the line was drawn. The Act of 1863 spoke only of hydrochloric acid when generated in the process of the alkali manufacture, but other processes generating this acid might be, and sometimes were, carried on by the same manufacturer, and on the same premises with the alkali manufacture, so that hydrochloric acid from two sources might be passing along through the same flue and issuing through the same chimney into the atmosphere. In such a case the inspector was actually obliged to estimate these separately. If, on testing the gases passing up the chimney, he found that an amount was escaping which exceeded the limit prescribed in the Act, he had to go back to the flue bringing in hydrochloric acid from some process other than that of alkali making, and deduct that from the total he had first found; if then the residue exceeded in quantity the legal limit it was his duty to complain, but not otherwise. So we had legal and illegal hydrochloric acid. I fear that when such a mixture reached the farmers' crops or the neighbouring oaks no such difference was made, but the desolation inflicted was in proportion to the amount of acid, without distinction of origin.

With regard to all other acid gases, some of them equally injurious with hydrochloric acid, the first Alkali Act was silent, whether these gases proceeded from an alkali or other works. Still the principle had been introduced of empowering inspectors to enter the works uninvited, and without giving notice of their visit, in order to ascertain if the condensation of hydrochloric acid, as provided in the Act, was carried out.

The act worked well; the inspectors' visits were not resented. Their business was to study one thing—the condensation of hydrochloric acid—and in this they became proficient. They could detect errors in the works that had escaped the eye of the foreman or manager less persistently directed towards them, their advice was sought in the erection of apparatus, and before long, under their influence, the forms of furnaces, condensers, and other appliances, were so much modified that the provisions of the Act were, with very few exceptions, habitually observed, and the statutory standard more than maintained. The standard in the Act was five per cent., but the amount of hydrochloric acid allowed to escape was reduced on the average to less than two per cent. Encouraged by this success, an amended Act was passed in 1874, which gave to the inspectors increased facility in controlling the escape of hydrochloric acid gas, and a modified power over some other gases from alkali works. The escape of hydrochloric acid had been limited to five per cent. of that generated; now a new method of measurement was introduced, the amount of acid escaping must also not exceed two-tenths of a grain in a cubic foot of the escaping air in chimney or flue.

Still the inspections were limited to alkali works; the gases or noxious vapours from all other sources were untouched.

To remedy this abnormal position, and to inquire into the subject generally, a Royal Commission was issued in 1876. Their inquiries extended over the whole kingdom, and a full report was issued in 1878. In this they recommended further legislation; and in 1881 the present Alkali, etc., Works Regulation Act became law. The main provisions in it which differ from those of the two preceding Acts are:—

1. The Act is made to apply to some other works than alkali works.

2. All noxious gases proceeding from alkali works are dealt with.

3. The principle is introduced of requiring that the best practicable method shall be employed in the repre nuisance.

4. An annual registration fee is chargeable on t of works.

The Act of 1881 is thus a great advance on tho and 1874, especially in that the principle is intr throwing on the manufacturer an obligation to e best known methods for preventing the escape of gas, or otherwise avoiding a nuisance. Wher standard is to be adopted there is great difficulty in it. At first probably it is felt to be sufficiently repressive, but as improved methods of manufa introduced it becomes loose and far below the standard actually reached—for instance, the st 0·20 grain per cubic foot as the limit of the amount chloric acid which may escape. For the last three quantity which actually escaped, as shown by the all the tests taken by all the inspectors throu country, has been 0·10 grain per cubic foot. The fixed as the limit of the amount of sulphuric acid e grains in a cubic foot of air. The average amoun escaping last year was 1·40 grain.

These standards, though felt to be sufficiently hi time they were fixed, are now evidently much be actually reached by manufacturers. An obligation, to adopt the best practicable method for the avoid nuisance is an elastic band which is always tig tightens with the increase of knowledge, and with t duction of improved processes, a change which going on. Moreover, this is an obligation which n reasonably repudiate, as no one can object to be ca do the best that can be done to shelter his neighb the injurious effects of his operations.

It may, however, be urged that this clause is nc enough for the inspector. Who is to say what is practicable method in a particular case? Fortu direct answer to this question is not required. If i of sulphuric acid the inspector finds that a man habitually allows his exit gases to contain 20 grain cubic foot, while the average amount is below 1 may safely be asserted that the best method for the tion or retention of this acid has not been employe

Moreover, the phrase not only goes beyon independent of definite fixed standards—it also c them. If it can be shown, after prolonged observa in conducting some process of manufacture a certai of success in controlling noxious emanations is achieved, this result becomes a basis for the future, a to which all are expected to conform; and this sta the great advantage over one rigidly fixed b Parliament, that it is one which accommodates its varying conditions of manufacture and the chan which knowledge brings to bear on it. In that t 1881 embodies this principle, and enjoins in c certain manufacturing processes that the best p means shall be used for preventing the discharg atmosphere of all noxious gases evolved in such makes a great advance over the past legislatio subject.

Another point where the last Alkali Act made beyond those which had preceded it, is the incre number of manufacturing processes brought within The first Alkali Act touched alkali works only. I Act are included also those for the manufacture of acid, chemical manure, nitric acid, sulphate and n ammonia, chlorine, salt, and cement. The attempt, to enumerate those works which should be schedule an Act as that now under our consideration can never successful. Scarcely is the ink dry with which s is written than works are established or processes to those already existing, which, had they bee sooner, would certainly have been included. As a of this might be given a process for preparing h strontia from the sulphate. This substance has l largely employed in the refining of sugar. In the its preparation the sulphide of strontium is decomp torrents of sulphuretted hydrogen are set free. Th easily be retained, but the inspector has no power to although in a neighbouring works, where, perhaps of ammonia is made, he complains if only a trac noxious gas is allowed to escape, and at once in rectification of the apparatus.

*(To be continued.)*

## GLASGOW INTERNATIONAL EXHIBITION.

BY THE RESIDENT REPRESENTATIVE OF THE "CHEMICAL TRADE JOURNAL."

Glasgow, April 21.

THIS Exhibition, which is to be opened by the Prince of Wales on the 8th of May, was to-day subjected to the practised scrutiny of an exceptionally strong force of journalists, representing papers not only at home, but a few stationed so far afield as the continent and America. The occasion was the press view day, and fully a hundred pressmen put in appearance in response to the challenge of the Executive Council. The birth of the project for an exhibition on a large scale in the industrial metropolis of Scotland took place two years ago, and vigorous health has characterised the undertaking ever since. The guarantee fund speedily amounted to £300,000, and the high patronage of the Queen and the Prince of Wales was readily procured. Kelvin Grove Park, or the West End Park, as it is commonly called, was chosen as the site, the Corporation giving the temporary use of nearly seventy acres of its area, of which fully fourteen acres are by this time occupied by the main and subsidiary buildings of the exhibition, erected at an estimated cost of £70,000. The style of the structure is Eastern, with lofty dome and attendant towers and minarets crowning the roof, while the interior plan (also Saracenic in decoration) takes the well-known form of grand nave and intersecting transepts, these giving off to right and left into numerous courts or bays. Operations, as shown in the view to-day, are well advanced within the province of the architect and building contractors, but there remains a large bulk of work for the exhibitors to get through. Some of the exhibits are complete, but these do not comprise more than a fourth, or perhaps a sixth, of the whole; still, short as the interval is, there is time before the 8th of May, with the force of workmen at present available (3,000 it is said), to have the whole in apple-pie order.

The exhibiting range of the great Glasgow display is a very wide one, and includes all the classes within the category of such an organ as the *Chemical Trade Journal;* but in the absence of catalogue aid, and particularly having regard to the embryonic condition of most of the courts, more than very general criticism is now impossible. The chemical, drysaltery, paint, oil, and mineral sections are found, for the most part, within the court to the south of the main avenue, a central and most favourable position. Rather more representative than numerous are the exhibits forward within these sections, but this is perhaps not a circumstance at which it would be seemly to grumble. Even the mineral oil companies of Scotland, whose headquarters may be said to be Glasgow itself, are to be select in the show they make rather than abundant, and of these the Broxburn Company is one of the comparatively few with stand complete—a really beautiful array of the artistic possibilities latent in the rude-looking shale dug from the pits. In the close neighbourhood of this is the trophy of Price's Patent Candle Company (also complete), Brunner, Mond, and Co. (incomplete), A. G. Kurtz and Co., St. Helens, and the Widnes Alkali Company (both complete), and the latter putting forth chemical samples of a varied and comprehensive character. Sadler and Co. are exhibitors of tar products, ammonia, etc., from the north-east of England, and a collective stand of extra size, surmounted by a bust of Leblanc, will prove a striking feature here as illustrating the chemical industries of Tyneside. Exhibits on the mechanical and engineering sides of chemical science and industries will be found fairly well to the front by the day of opening, but as yet few of these are in completed position, and of course there is nothing in motion. Particularly strong in number and variety will be the sections, or divisions of sections, devoted to the display of sanitary appliances, some of which are already placed. Detailed criticism is necessarily held in reserve.

One exhibit of what may be called an accidental and informal kind may possibly prove unexpectedly effective, and that is the River Kelvin itself, which divides the seventy acres of exhibition area in twain, and flows right underneath the northern or main *façade* of the building. From the condition of the Kelvin may be deduced some data concerning the operation in Scotland of the act for the prevention of rivers pollution, an act which has been a good many years in force without (in Scotland at least) performing much in justification of its existence. Last summer this river, which has numerous polluting works in its upper reaches, smelt so badly when low of volume with the drought, that park frequenters of only ordinary nostrils ran risk of being driven away altogether. The Executive Council of the exhibition early directed a wise attention to the shortcomings of the stream, deepening its bed, and freeing it from all sewage outfall, at least on the side of the city of Glasgow, but it has been impossible to deal fully with the upper dyeing and other factories, and there is room still for a little anxiety. By means of a weir, some distance down, the river is kept calm and placid while passing the building, bearing all the appearance of a strip of canal; and as gondolas from the Adriatic, electric propellers, and what not are to ply on its bosom, it is in the highest degree desirable that, in a sanitary sense, it should be on good behaviour. If the exertions of the council meet with due reward it will be on good behaviour, and thus show what can be done toward maintaing the purity of rivers where there is a will.

## SOCIETY OF CHEMICAL INDUSTRY.

LONDON SECTION.

A paper was read by Mr. C. T. Kingzett, entitled "Notes on the manufacture of chlorine, with special reference to the use of magnesia in that process, and its economy."

The paper contained the results of a series of laboratory experiments undertaken with a view of elucidating certain phenomena underlying the Weldon-Pechiney process recently described by Professor Dewar. The author has patented a process for the production of chlorine by the passage of heated air and hydrochloric acid over a mass of porous material containing magnesium oxide, the latter being used indefinitely.

The second paper was by Messrs. C. F. Cross and E. J. Bevan, on "Further notes on M. Hermite's process of electrolytic bleaching."

The paper gives the results of a series of laboratory investigations of the electrolysis of magnesium chloride, undertaken with a view of elucidating the complicated reactions which the authors pointed out in their paper of March 7th, 1887.

Since this paper was read, Dr. Hurter published a paper in which he pointed out as the result of his experiments that Messrs. Cross and Bevan's estimate of the cost of bleaching by means of electricity, instead of being cheaper than the ordinary method with bleaching powder, was in reality from three to six times as great. Considerable space is devoted in the present paper to a refutation of Dr. Hurter's statements, which the authors state appeared so highly improbable to them that they felt no pressing necessity to vindicate themselves from their effect.

The method of experimenting consisted in passing a current of electricity through a copper voltameter into an electrolyser containing solution of magnesium chloride. The electrolyser was so arranged that the gaseous products of the electrolysis were conducted away to a Lunge's nitrometer, where they could be measured and examined. By means of a small fan worked by an electromotor the magnesium chloride was kept in circulation.

The chief results of the investigation are that only a relatively small amount of chlorate of magnesia is formed, and that perchlorate is entirely absent. The authors further show that the formation of perchlorate when magnesium chlorate is electrolysed depends entirely on the size of the electrodes as compared with the current passing. They further show that even in some of Dr. Hurter's experiments no perchlorate is formed. The numbers given show a minimum efficiency of 73 per cent. available chlorine, which the authors state is sufficiently high to ensure the economical success of the process. They point out, however, that they have reason to believe that a much higher efficiency is attainable on a large scale.

The paper contains the results of a trial of the process for linen yarns made in Belfast comparatively with the ordinary method, showing a cost of about one to three in favour of the electrolytic method. Another important feature is that the bleaching is effected in about one-fourth the time necessary with bleaching powder.

The paper concludes with a criticism of Dr. Hurter's method of investigation, which the authors point out was eminently calculated to give bad results. The authors also criticised his explanation of the course of the electrolysis.

The original estimate of the cost of bleaching by the process is confirmed by the results as well as by experience of working on the large scale.

# Correspondence.

## ANSWERS TO CORRESPONDENTS.

C.—There is no doubt about it whatever. The game will be tried soon, but it will not succeed.

J. R.—Apply to the advertisers. We cannot tell his prices for large orders; they would certainly be less than for single tons.

J.—Yes. We think what we say, but we do not always say what we think.

RTAR.—The rumour is that the owner will endeavour to turn the concern into a limited company. If so we pity the shareholders.

LOCK.—Yes, he was promptly dismissed, but the reasons for this step have not been made public.

R.—There are too many chemists in existence now. We would advise you to try some other profession.

C.—It is a close trade. If you were to start the existing makers would soon run you off the road.

AREMONT.—Have nothing to do with it unless you wish to lose your money.

** We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—The report of the proceedings at the last annual meeting of the Institute, held in London, and published in our valuable journal, ought to be sufficient to show the country Fellows that they will never get any wishes they may desire attended to, for directly a Fellow from the country raises his voice a clique of London Fellows is formed to back up the council in all its misdeeds, or rather the absence of deeds of any kind at all. It may be argued that as the council is composed of members from all parts of the kingdom country members have every opportunity of expressing their views through their representatives; but when it is known that all council meetings are held in London, and that the majority of members present at those meetings are residents, it will be seen at once that country Fellows can never expect to have a proper voice in matters.

We have in the provinces waited patiently for the past ten years for the Institute to develop, and what is the position to-day? The Institute has obtained its charter—charter for what? Will it enable the council to stop unqualified persons from practising? Will it stop all those who are not Fellows from giving scientific evidence in the law courts? Will it stop manufacturers from employing untrained chemists, who are not Fellows or Associates of the Institute, in their works? If the charter will not enable the Institute to do either or all of these things, pray what will it enable the council to do? If it will only enable it to declare that no one who has not been trained in one or more of certain schools or colleges will be admitted to examination then we have a measure of its worth, and it is well that all who put F.I.C. after their names should well consider the worth of these mystic figures. The Institute did not do much before its possession of a charter to add either to the dignity or the welfare of the Institute, and after the possession of this coveted treasure what has it done? Positively gone to the wayside and dragged in the poor, the maim, the halt, and the blind, *without examination*, as during the past year anyone could be admitted if he metaphorically could produce a signature or two to show that he was a jolly good fellow.

The result of the last annual meeting shows clearly enough that the council will have the tune played their own way even if others have to pay the piper, and I would therefore suggest to those who cannot see any good in the present administration to stop the supplies by ceasing to pay the subscription. I know of several Fellows who have not paid their subscription for years, and yet they are not struck off the roll. I am not sure whether all analysts in public practice are eligible for membership to the Society of Public Analysts or whether this society is solely composed of analysts appointed under the Adulteration Acts. Perhaps if this letter meets the eye of Mr. A. H. Allen, who, I believe, is the president of that society, he would inform your readers and myself on that point. I am of opinion that that society is doing far more useful work than the Institute of Chemistry, and that it would be well supported by chemists generally; and I also believe that many Fellows of the Institute would transfer their subscriptions to the Society of Public Analysts if they knew they were eligible for membership.

It seems at present as if we all had to pay an annual tax to enable a special few to air themselves on special occasions, and, what is worse, to support a project to endeavour to fill certain schools and colleges with students. I say, for one, have a severe examination, superintended by a committee, and have not a single care as to how, where, or when the candidate obtained his information. Reform is certainly required. Will nobody come forward to rid us of this "oligarchy."—I am, etc., A COUNTRY FELLOW.

# Trade Notes.

IT WAS A SURPRISE FOR HIM.—A correspondent writes:—"Under the idea that I was reading a back number of *The Chemical Trade Journal*, I read of bleaching wood with peroxide of hydrogen, bleaching wool with peroxide of hydrogen, aaline black (which should be aniline black), indigo in China, bleaching cotton with hydrogen peroxide, bleaching silk with hydrogen peroxide, bleaching sponge with hydrogen peroxide, all of which articles have appeared in your journal, when to my surprise I found I was reading the *Dyer and Calico Printer* of April 16th, and all these articles appeared without acknowledgment."

We are much obliged to our correspondent for pointing out this incident, it is a pretty big haul for the *Dyer*, but we do not grieve; it is better to laugh than to cry over the follies of mankind, and this case is not so bad as that of a canvasser for advertisements of another paper (which copied, even to a printer's error, our account of the Hargreaves engine), and who entered the office of one of our advertisers with the words, "if you give me an advertisement I will see you get a prominent notice in the body of the journal. Look at this notice of the Hargreaves engine." *I wrote it myself!!!*—ED. *C. T. J.*

EXHIBITION OF GAS APPARATUS.—The directors of the Bristol United Gas Light Co. propose to give an exhibition of gas apparatus in the Drill Hall, Bristol, during the fortnight ending May 26th next. Space will be granted to intending exhibitors on application, and on sending an estimate of the space required to Mr. Jas. V. Green, the secretary.

WORKMEN'S WAGES IN BELGIUM.—The following table, comprising the daily pay of several classes of workmen, is extracted from the return made by the proprietors of the celebrated works of John Cockeril and Co., at Seraing, near Liege:—

| | 1872 | 1875 | 1878 | 1881 | 1884 | 1886 |
|---|---|---|---|---|---|---|
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Coalminers ..... | 2 5 | 3 4½ | 2 5¼ | 2 6½ | 2 7⅜ | 2 4⅜ |
| Cokemakers ..... | 2 2 | 2 6½ | 2 3 | 2 3 | 2 2¼ | 2 1½ |
| Miners ..... | 1 10 | 2 1½ | 1 11½ | 2 0 | 2 0½ | 1 11 |
| Blast-furnacemen | 2 5 | 2 7½ | 2 4¼ | 2 3½ | 2 3½ | 2 2½ |
| Founders ..... | 2 4⅜ | 2 7½ | 2 6 | 2 5½ | 2 4 | 2 3½ |
| Ironmakers ..... | 2 8 | 3 0½ | 2 11 | 2 8 | 2 9 | 2 5½ |
| Steelmakers ..... | 2 10 | 3 3½ | 3 0½ | 2 10⅜ | 2 10⅜ | 2 8⅜ |
| Constructors ..... | 2 6½ | 2 11½ | 2 8½ | 2 9 | 2 9 | 2 8½ |
| Boilermakers ..... | 2 5½ | 2 10 | 2 6¾ | 2 6⅜ | 2 7½ | 2 6¼ |
| Naval yardsmen... | 2 1½ | 2 7 | 2 5 | 2 5½ | 2 4⅜ | 2 5¼ |
| Forgers and hammerers ..... | 2 9⅜ | 3 2 | 2 9 | 2 10⅜ | 2 8½ | 2 9⅜ |
| Carriers ..... | 2 6¾ | 2 8½ | 2 4⅜ | 2 6 | 2 8⅜ | 2 9 |

THE SALT BEDS OF NEW YORK.—The product of salt reservation at Syracuse, N.Y., for 1887, was 5,695,797 bushels, and there was a deficit of $3,500. The average output has been 7,000,000 bushels per year, and this deficiency is a serious matter, especially as it appears to be not merely temporary. It is due partly to the decreasing strength of the brine, partly to the fact that salt in Michigan is produced at less cost for fuel, and partly to the fact that the mining of salt is now practicable in other counties of the State. At the Syracuse reservation there are five groups of wells, but only about 75 per cent. of the total number are available. The average income to the State for forty years has been about $18,000, and last year the reduction in revenue was $4,059·60. Two wells driven 1,600ft. and 2,000ft. failed to strike rock salt, but the Legislature is asked to appropriate funds for new wells. The salt beds of western New York are about 120 miles east and west by forty to fifty miles north and south; the area of the district is about 5,000 square miles, and the beds average 40ft. in thickness.—*Engineer.*

# COKE IN THE STATES.

STATISTICS OF THE MANUFACTURE IN THE UNITED STATES FROM 1881 TO 1886 INCLUSIVE.

| | 1881. | 1882. | 1883. | 1884. | 1885. | 18 |
|---|---|---|---|---|---|---|
| Number of establishments | 197 | 215 | 231 | 250 | 233 | |
| Ovens built | 14,119 | 16,356 | 18,304 | 19,557 | 20,116 | |
| Ovens building | 1,005 | 712 | 407 | 812 | 432 | |
| Coal used, short tons | 6,546,662 | 7,577,648 | 8,516,670 | 7,951,974 | 8,071,126 | 10,6 |
| Coke produced, short tons | 4,113,760 | 4,793,321 | 5,364,721 | 4,813,805 | 5,106,696 | 6,8 |
| Total value of coke at ovens | $7,725,175 | $8,462,167 | $8,121,607 | $7,242,878 | $7,629,118 | $11,1 |
| Value of coke at ovens, per ton | $1.88 | $1.77 | $1.49 | $1.40 | $1.49 | |
| Yield of coal in coke, per cent. | 63 | 63 | 64 | 61 | 63 | |

GRAIN CARRIED FOR NOTHING.—Reference has been made to the fact that one of the passenger steamers carrying from New York to Great Britain has accepted a part cargo of grain as ballast—without payment. A year ago the rate was low—it was 2¾d. per bushel at the beginning of April—about one-half of what it had been some three months previously. Some years ago, grain was for a month or two carried for nothing from America, but the number of steamers taken from the trade soon restored payment, if not payable rates, and it will probably be so now. Still the prospect is not brilliant for large steamers.

THE REGISTRATION OF FIRMS.—The proposal for the compulsory registration of firm names has been brought before parliament this year by Sir Albert Rollit, M.P. According to this scheme every firm that carries on business under a firm-name not consisting of the full or usual names of all the partners or all the acting partners without any addition would have to be registered; as also would every person that carries on business under any firm-name consisting of or containing a name or addition other than his own full or usual name. The particulars required by the Bill to be registered are (1) the firm-name; (2) the nature of the business; (3) the place or places of the business; (4) the full name, usual residence, and other occupation (if any) of the person or persons engaged in it; and (5) where a business is commenced in the future or a new place of business opened, the date of such an event. The statement of these particulars is to be written and signed by the persons themselves, or is to be acknowledged in the presence of a magistrate or a solicitor, by whom the signatures or acknowledgments are to be attested. And whenever a change occurs in the constitution of a firm it is to be registered, as also is any change in the name. For default in registration the *maximum* fine is fixed at £1 for each day during which it continues; and for knowingly making false returns the punishment may be imprisonment with hard labour for a term not exceeding two years. The register is to be kept by the registrar of joint-stock companies; and he will send abstracts of the statements to the registrars of County Courts in whose districts the places of business are, and they will also keep indices, etc. The statements thus registered are to be open to any one's inspection on payment of a small fee. After registration the registered name is directed to be used in all matters relating to the business carried on.

NATURAL GAS AT NEWCASTLE.—Last June a "blower" of natural gas was struck in the underground workings of the Hebburn Colliery, near Newcastle-on-Tyne, and remained for fully six months a source of annoyance and danger to all in the pit. At the commencement of the present year—as the flow seemed likely to be permanent—it was decided to utilise it by running a 6-in. pipe from the "blower" to the surface, and burning the gas in one or more boilers. On the 26th of February the gas was successfully lighted in a large Lancashire boiler, which has continued to work steadily ever since. It is believed that the flow is sufficient to supply four boilers, and three others are accordingly to be connected with the gas main. The gas is introduced to the boiler flue by an annular burner, the flame being afterwards broken up and spread by a brick bridge placed about 7ft. from the front end. The evaporative power of the gas is great, and the arrangement, when complete, is expected to result in a saving for fuel and labour of about £3,000 per annum.—*Industries.*

THE FALL IN VALUE OF SILVER.—As exemplifying in a striking manner the effect of the fall in the value of silver on investments, it may be mentioned that in 1876 a local house advanced $70,000 for investment in the East, the money being paid in sterling money by £13,552 1s. 8d. At the time it was stipulated tha called up the money should be repaid by bills upon for a like sterling amount. At the present time the the borrower through the fall in silver is $17,905, an sterling value at the current rate for exchange, £2,76 Since 1876 interest at the rate of 8 per cent. has be on the original sum.

THE CHARACTER-NOTE SYSTEM.—The following has been issued to workmen on Tyneside:—

"Fellow Workmen,—For several years past a gre of our shopmates have had to suffer great privation a through the character-note system. If any of us enough to get up in the shop or on a public plat advocate the elevation of the class to which we belo immediately marked by our employers, and by mean system he is prevented from getting work anywher district or even in the county. The system is so wid that wherever we go, the same thing is only too easi As several of our fellow workers are suffering from i present moment, we shall be glad to meet you in Lo Cocoa Rooms, Clayton-street, on Saturday, Apri 7-30 p.m., when a scheme will be laid before you consideration, whereby we may support our leader the same time show that we can appreciate pluck, and truth.—We remain, yours in unity—THE COMMI

IMPORTANT TO THE LARD TESTERS.—A new produc saponification of cottonseed oil has recently been d in the *Comptes Rendus* by M. Ernest Milliau. The c substance which is not observed in the fatty acids oil, is so sensitive that by its means the presence ma be detected of 1 per cent. of cotton oil in olive oil. of error is removed, as the operation is effected, not oil itself, but on the fatty acids free from all impurity

THE IRISH EXHIBITION IN LONDON.—The exhib Irish industries, which is to be held during the sum Olympia, Kensington, will open on the 4th June and the end of October.

VOLAPÜK.—There are Volapükists in St. Peter speakers of the new universal language called Volapü up till now, they could have no Volapükist litera being the law of the land to proscribe all books wh Censors cannot read. The obstacle is being surm however. Through the consideration of the Gove one learned in the Volapük is to be, if he has not been, appointed to the Censure. Henceforwa Volapükists will have free scope in the Empire to spe time and breath for nought.

MARGARINE.—Does a rose under another name s sweet? At any rate, the substance once sold as oleo-ma until lately sold as butter, and now sold as simple ma tickles the public palate and slides down the public œs with equal pleasantness and ease, no matter what th The Board of Trade returns show how much mistak were who anticipated that the new law, forbidding paration from beasts' fat to be sold as butter and ord to be called margarine, would diminish the demand substance and increase the demand for home-made There is no falling off, however, in the importa margarine.

"TAXING" AND THE RESULT.—Carlisle Council went to Parliament for enlarged powers. The cos Act which was procured was £3,715. There was off two accounts the sum of £48. 17s. 6d. But the taxation" came to £47. 2s. 8d., so that the Council very little by the process of taxing. Even with th reduction in the cost, the Act was produced at an ex £3,713. 16s. 2d.—a tolerably large sum to pay.

The London Coal Dues.—An important letter has been addressed to the Right Hon. W. H. Smith, M.P., by Mr. George Livesey, the chairman of the South Metropolitan Gas Company, on the relation of the coal dues to the gas companies. Mr. Livesey shows that the South Metropolitan Gas Company supplies nearly all South London; and last year it used 557,000 tons of coal. The duty on this coal was over £30,000; but as part of the coke was taken outside the bounds in which the dues can be enforced, the net amount paid was just about £27,000. When the coal tax expires this sum will be saved. It is expected that the price of the coke (largely used by the poor) will fall in price 1s. per ton, so that the saving to the customers of this kind of fuel would be £11,000. Mr. Livesey estimates that there would be some addition to the rates, and the gas company might have to pay £1,000 more. Thus there is left for the benefit of the gas consumers £15,000. Such a saving, when coupled with the increased business, justifies his announcement that "if the coal dues were not renewed, we should reduce the price of gas by 1d. per 1,000 cubic feet." He believes that the directors would not make any additions to the dividends of the companies in consequence of the cessation of the coal dues; and as desiring to see cheap gas and coke for London, he protests against "any renewal of the coal dues."

A Warning.—A Detroit pedlar of tinware took ouf some egg-beaters on his last trip; and as the price was only 15 cents each, and they worked on a new principle, he calculated on big sales. His first experience will answer for all. He drove up to a farm-house in the western part of Wayne county and took a beater in to exhibit. The people liked it exceedingly well, but the old farmer said, "Young man I want to see your patent." "I have none." "Then your written authority to make sales." "Don't need any." "Then you must give me a bond, with two sureties in the sums of $1,000, that you will stand between me and any trouble." "But I can't do that." "Then I can't buy. I've just had to pay royalty on a drive-well, damages for using an infringement on a patent gate, and have a lawsuit about a hay-fork, and another over a windmill; and we don't even buy a dish-pan without a bond that it don't infringe on somebody's patent bath tub."—*Invention.*

The Porcelain Industry at Buckau.—According to the financial report for 1887 the total manufacture of porcelain and chamotte by the Buckauer Porcellan-Manufactur equalled in value 259,450 mks., against 251,467 mks. in 1886, while the sales amounted to 352,567 mks. in 1886. The net profit amounted to 25,630 mks., with which a dividend of 5 per cent. is to be paid upon the preference and 4 per cent. on the ordinary shares.—*Kuhlow.*

The Cement Industry.—The financial results for the last year of the Adler, Deutsche Portland-Zement-Fabrik were in a large degree unsatisfactory. The directors prove, indeed, a net profit of 126,139 mks., with which a dividend of 8 per cent. could be paid. A dividend of only 4 per cent. is recommended. As the working capital is too small, and it is desired to pay off the 5 per cent. mortgage debt which only falls due in 1892, new shares to the value of 450,000 mks. will be issued. The total receipts last year amounted to 467,887 mks., against 376,293 mks. in 1886. The Alsen'sche Portland-Zement-Fabriken in and near Itzehoe, probably the largest works of the kind in the world, have just celebrated their 25th anniversary. On this occasion, 20,000 mks. were voted by the directors to be spent on a benevolent institution for the workpeople. The factories belong to a share company, and had a production in 1864 of 8-10,000 barrels, which rose in the following year to 60-68,000 t. Since then the production has increased so much that in 1887 it amounted to no less than 550,000 t. From small beginnings the factories have become larger and more important by degrees, and contain at the present moment thirty-six combustion furnaces as well as one large ring furnace.—*Kuhlow.*

Adulteration of German Beer.—Three more brands of German beer, from Bremen, Hamburg, and Vienna, respectively, have come under the condemnation of the Mayor of Manila, from their being found to contain salicylic acid on examination. Their sale in that city has been forbidden. The holders are directed to destroy or export them. *Straits Times.*

The Hamburg Guano Trade.—The financial report of the Anglo-Kontinentale, vormals Ohlendorff'sche Guanowerke, at Hamburg, states that the sales for 1887 amounted to 123,123 t., against 101,204 t. in 1886. At the close of the year orders were in hand to the amount of 19,124 t., against 15,941 t. in the previous year. The gross profit upon goods and manufactures equalled 1,747,476 mks., against 1,122,939 mks. in the previous year, and after deducting for expenses of all kinds a net profit of 1,037,547 mks. remains over. The report mentions the new contract which the company completed in the January of the current year with the government of Chili for a monopoly of the import of guano to Germany, Great Britain, Belgium, Holland, Scandinavia, Russia, Northern Austria, Hungary, and Switzerland. In consequence, the demand of the factories for this kind of manure is in all probability assured for a long time in advance. The company expects to derive greater advantage from this contract than from former ones, because nearly all guano stocks from previous importations of other companies are disposed of, and there is at present no quantity of Peru guano worth mentioning in other hands. The Anglo-Kontinentale Werke have reduced their stocks from 15,420,000 mks. in value to 12,200,000 mks.—*Kuhlow.*

Cost of Drilling a Gas Well.—The cost of drilling a gas well is about the same as that of an oil well under the same conditions. It varies usually from $3,500 to $6,000, according to the depth. Where the productive measures are nearer the surface the cost is materially less. The method pursued is the same in both cases. A derrick is first set up on the intended site of the well, and a wrought-iron pipe driven through the soft earth until it reaches the solid rock, usually at a depth of 60 to 100 feet. The weight of the drills with the attached "jars" is 3,000 to 4,000 pounds. These rise and fall four or five feet, and are constantly rotated, so as to bring the bit into contact with the entire circumference of the drilling. For a depth of 500 feet the hole is bored eight inches in diameter, and is cased with 5⅝-inch piping. Beyond this depth the hole is continued with a diameter of six inches until gas is reached or the well abandoned. A casing of 4-inch piping is used for this lower portion. Under ordinary circumstances, about fifty days are required for the drilling.

An Engineer on Newspapers.—A great newspaper is a mighty engine. If I were to run such an engine, a real, literary, political, social, moral locomotive, I'd fill her with the coal of conviction and the water of candour, and get up the steam of enthusiasm. Then I'd grasp the lever of intention with the hand of justice, and run her out upon the main track, hook on to the leading ideas, open the sand-box and pull out for the next station on the road of progress, leaving the dead from the last disaster to be buried by those who love to linger about the deserted stations of the past. Steam would be reversed on account of warnings from ahead, but never on account of wailings from behind.—*American Manufacturer.*

Honours for a Distinguished German Chemist.—The celebrated German chemist, Professor August Wilhelm Hofmann, celebrated his 70th birthday on Sunday week, and received numerous marks of esteem and distinction. The Emperor conferred upon him a title of nobility, and the Empress and also Queen Victoria, to whom the Professor became known during his twenty years' sojourn in England as superintendent of the Royal College of Chemistry, and afterwards of the laboratory of the School of Mines, sent him their portraits handsomely framed. The governing body of the German Chemical Society presented to Professor Hofmann, in the course of the day, a congratulatory address, signed by Sir Frederick Abel on behalf of the chemists of Great Britain, by Signor Caunizzaro for those of Italy, and by Mr. Walcott Gibbs in the name of the savants of the United States, and accompanying the address were a marble bust of the Professor and a sum of 30,000 marks, to be devoted to the foundation of a Hofmann Institute.

The Aniline and Soda Industry at Baden.—At a meeting which has just been held of the Badische Anilin- und Sodafabriken the balance-sheet was produced and laid before the shareholders. The net profits of the establishment for the past business year amount to about 4,800,000 mks. A dividend of 16 per cent. against 15 per cent. last year was recommended.—*Kuhlow.*

Glass-Blowers and Coke-Burners' Hands.—That there are disorders peculiar to certain handicrafts is well known. But Dr. Poncet, of Lyons, calls attention, in the current number of the *Revue Scientifique*, to a deformation among glass-blowers, which appears to have escaped notice thus far. Through long manipulation of the blow-pipe, the hand becomes so that it cannot be opened, the finger-joints becoming deformed, and showing a tendency to subluxation. May we ask is there not a something of the same kind frequently to be seen amongst our own coke-burners or cinder-drawers?

Purification of Sewage by Electricity.—The following letter appeared in last week's *Engineer* from Mr. W. S. de L. Roberts, of Sydney, N.S.W.:—In the number of the *Engineer* of January 13th, just received, I notice an article on "The Purification of Sewage by Electricity," an invention patented by Mr. Webster. Now it is a curious fact that I patented the same idea in the colonies, my provisional protection for New South Wales being dated November 19th, 1887. As far back as last July I communicated the idea to several friends, and went through a series of experiments. The Government of New South Wales then took it up to investigate, and try on a large scale if found satisfactory. It has been known for some time that one of the best ways of detecting nitrates in water is by the zinc-copper couple, which decomposes nitrates into nitrites and then into ammonia—see Blith on food composition and analysis. Dr. Medlock, I believe, also discovered that iron, copper, lead, and platinum had a peculiar property of purifying water by the decomposition of ammonia into nitrous acid and then into nitric acid. It is also known that oxygen when taken up by sewage renders it inoffensive, and therefore sulphate of iron is used as a carrier of oxygen to the sewage. Now if water in sewage is decomposed between two electrodes of some metal or carbon, the oxygen does not escape, but is taken up by the sewage. Ozone, or what is called binoxide of oxygen, which the electric current is capable of forming, seems to be more deadly to decomposing animal matter than simple oxygen. With some metals there are also other actions going on, and a portion of the metal is deposited probably from the nitric acid formed. Salt is also decomposed into sodium and chlorine. Now malaria or morbific and putrescent miasmata consist chiefly of hydrogenous matter as their basis, and are best counteracted by chlorine. The chlorine may also combine with other alkaline bases, such as carbonate of soda, to form chloride of carbonate of soda, which is a powerful disinfectant. Phosphate of soda and ammonia phosphate of soda may also be formed. The process is such a delicate test for impure water that if two drops of water slightly contaminated with sewage are placed in a glass full of pure distilled water, and a current of electricity sent through, the impurity will be immediately detected. I am now making an electric filter, with which I hope to clear away organic impurities.

Startling Incident at a Lecture.—At St. Margaret's Hall, Dublin, last week, Sir Charles Cameron was giving the first of a series of lectures on "Gases: good, bad, and indifferent," when a startling explosion brought the lecture to an abrupt conclusion. The lecturer was illustrating experiments and generating hydrogen gas when the explosion occurred, shattering the utensils. Several of the audience, which included Princess Edward of Saxe-Weimer, were struck with the splinters.

Jams.—In the report of the Chief Inspector of Factories, there is an extract made from that of Mr. Cameron, one of the Irish inspectors. He states that "marked prosperity" attends the preserve manufacture in Belfast. In August last, one firm in that town used "£2,197 worth of sugar" in making preserves. Its town traveller sold in one day in Belfast "50 tons of preserves, and orders came in on the same day from wholesale houses for 30 tons additional." There should be, with this large use and sale, sweetness, if not light, in Belfast.

Paper Pulp.—An invention is reported from Oran, in Algiers, that is calculated to tell upon the prosperity of that colony, and upon the paper industry everywhere. Two-thirds of the material used in preparing fibre from the leaves of the dwarf-palm have heretofore been cast out as waste. But by the ingenious contrivance of M. Raynaud, a manufacturer at Oran, this waste is now being made into an excellent paper pulp. It can be produced at half the price of the pulp made from *alfa*—that is, the fibre of esparto, or Spanish grass.

The Cost of Melting Snow.—The experiment of melting snow by steam was tried at New York after the recent snowstorm, but (says *Iron*) it does not seem to have answered very well. Many persons were more or less successful, by running temporary pipes from their boilers into the snow-banks or into large boxes, into which the snow was shovelled. The emergency justified such an expensive expedient; but it should not be imagined that this method of removing snow could be generally adopted. To melt a pound of snow or ice takes as much heat as would raise the same weight of water from the ordinary temperature of 70° to boiling point. Removing snow by melting in various ways has been frequently proposed. For instance, snow has been thrown down sewer manholes, and there melted on iron plates kept hot by gas jets. This plan also has been found to be impracticable, for to melt by gas snow from a mile of ordinary street after a fall equal to 3 inches of rain, about equal to that of the late New York blizzard would require the consumption of about 100 tons of gas coal, provided all the heat was utilised; practically, it would take a great deal more.

## BEETROOT SUGAR ITEMS.

**Germany, April 6.**—The weather improves but slowly. Sowing is fully three to four weeks late. The area to be sown will probably be 5 per cent. larger than last year. The navigation of the Elbe has reopened, and it is expected exportation will soon become active. Last month it only reached 18,000 tons against 94,236 tons in March, 1887. But home consumption is increasing. It is estimated that the quantity of sugar available for exportation from April 1 to the end of the campaign will be 198,000 tons against 222,478 tons in 1886-7.

**Austria, April 4.**—The soil has become more workable, and sowing will soon commence. The inducement to grow roots and manufacture sugar is so small that it is probable the large production already estimated will not be realised.

**France, April 11.**—The prolonged winter is not yet over, there having been during the past week a return of frost and snow. The soil, however, has become drier and in better condition to work upon. There is a delay of at least three weeks in sowing operations, which cannot commence earlier than the 15th to 20th of April. The area sown will not be less, and, with favourable weather, the production will largely exceed that of last year. From 1882-3 to 1886-7 108 manufactories have ceased working altogether, with a reduction in the number of those engaged in the industry of 16,245, and it is feared that instead of improving, the industry will become still worse if certain proposals now before the legislature are adopted.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

On the whole there is a measurable improvement in this market as compared with the conditions so long maintained and still partly existing a week ago. Bleaching powder is selling freely to local consumers at last week's enhanced quotation, and promises a further rise. Caustic soda is in very fair demand, and makers' prices are all higher. Bichromates also have pulled up considerably from the very low position occupied ten days ago; but in neither of the stock varieties is the demand up to the normal point. Sulphate of ammonia has declined with the advancing season, and the transactions are confined to immediate requirements for the most part, for which the figure to-day may not be put down higher than £11. 17s. 6d. Paraffin chemicals are if anything still weaker, partly a consequence of the season of the year, which in paraffin oils, scale, and wax, is always a time of comparative lull in marketing. The first of the large manufacturing concerns to declare balance-sheet results is this year the Clippens Mineral Oil Company (Limited), with nothing to divide or write off, but stopping short of a positive deficit, as was the case at March 31st last year. General prices current are:—Soda crystals, 40s. net Tyne; alum in lumps £5, less 2½ % Glasgow; borax, English refined, £31 and boracic acid £41 net Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76°, £8. 5s.; 70/72°, £7 60/62°, £6; and cream, 60/62°, £5. 17s. 6d., less 2½ % Liverpool; bicarbonate of soda, 5cwt. casks, £5, and 1cwt. casks £5. 5s. net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne saltcake, 20s. 6d., less 2½ % f.o.r. Glasgow; bleaching powder £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash 4¼d., and of soda 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 10s. 4½d. chlorate of potash, 5⅝d., less 5 % any port; sulphate of ammonia, £11. 17s. 6d. f.o.b. Leith; sulphate of copper, £21 paraffin scale, hard, 2 1/16d., soft 2d.; paraffin wax, 120°, semi-refined, 2 1/16d.; paraffin spirit, 4½d.; burning oil, 5⅝d. to 6d. lubricating oil, 865°, £5 to £5. 5s.; 885°, £6 to £6. 10s.; and 890/95°, £7. 10s. to £7. 15s. Greenock: Sugar imports were 1,606 hogsheads and 42,416 bags. Other western discharges were 6,210 tons iron ore, 1,900 tons manganese ore, and 1,833 barrels rosin.

## IVERPOOL MINERAL MARKET.

no change to report in the market this week, ning without sensible alteration. Manganese: been small, but there is no alteration to report agnesite (containing 98 per cent. of carbonate of thout alteration at 30s. to 35s. for raw lump; £6. 10s.; and calcined ground, £10 to £11. n Hill brand) continues in good demand at full for lump; seconds, 15s.; thirds, 12s.; ground, te, 7s. 6d. per ton at the mines. Barytes (car- air demand, and brings full prices. Selected rce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; ood nuts, 75s.; smalls, 50s. to 60s.; best ground, selected crystal ground, £8. 10s. Sulphate lump, 35s. 6d.; good medium, 30s.; medium, 7s. 6d.; common, 18s. 6d. to 20s. China clay: s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. ncorn). Pumicestone in demand; ground, at 7; specially selected lump, finest quality, £10 Mica (ground), £50. Purple ore, 6s. Spanish s ore, 18s. to 20s. c.i.f. for forward delivery. is in fair demand, stocks being low, at £5. 5s. to lump; and smalls, £5. Fullers' earth steady, r best blue and yellow; fine impalpable ground, n and tungstate of soda quiet. Tungsten metal lb. Chrome metal, 5s. 6d. per lb. Tungsten lb. Chrome ore in fair demand, and prices are robability of an increase. Antimony ore firmer; for fair quality. Antimony metal, from £50. s. to 32s. 6d. Asbestos: Best rock, £17 to £18; , £14 to £15. Potters' lead: Smalls, £11. 10s. ted lump, £13 to £14. Calamine quiet, 60s. to a steady; sulphate (celestine) 17s. 6d.; more onate (native), £15 to £16; powdered (manu- 1 to £12. Limespar, 45s. for ground. Plumbago: lump is £25 to £35; good, £20 to £21; chips, ther qualities, £4 to £12 per ton. French sand, 16s. to 17s. Ferromanganese: 80 % packed, 70 % packed, £10; 60 % packed, £8. 16s.; 50 % 7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, Silicon spiegel, 9 %, £8. Chrome pig, 9 to £8. 10s. Bitumen, finest picked, £35; original £23.

## LIVERPOOL COLOUR MARKET.

re without change. Ochres: Oxfordshire, £10, £16; Derbyshire, 50s. to 55s. Welsh, best, 60s. nds, 47s. 6d.; and common, 18s. Irish, Devon- 45s.; French, J.C., 45s., 55s., to 60s.; M.C., d. Umber: Turkish, cargoes to arrive, 40s. to hire, 50s. to 55s. White lead, £21. 10s. to £22. 19 to £20. Oxide of zinc: V.M., No. 1, £19; £18. Venetian red, £6. 10s. Cobalt: Prepared d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 2, 2s. 6d. Terra alba: Finest white, 60s.; good, Rouge: Best, £24; ditto for jewellers, 1s. p black, 25s. to 28s. 6d. Oxide of iron, prime to £15. Paris white, 60s. Emerald green, 10d. byshire red, 60s. Vermilionette, 10d. per lb.

## ERPOOL CHEMICAL MARKET.

s have ruled steady during the week, without ration in prices, except for caustic soda and salt- have become much firmer. Soda-ash 1d. up. : 60 % white, £5. 17s. 6d.; 60 % cream, £5. 15s.; £6. 17s. 6d.; 74 % £7. 10s.; 76 % £8. 5s. to Bicarbonate, £6. 10s. Nitrate of soda: There is ement at 9s. 6d. to 10s. Soda crystals, £2. 12s. 6d. soda: Brown lump, £6. 15s.; green lump, 100° solution, £4. 17s. 6d.; and 75° solution, Bleaching powder, £7. 5s. to £7. 17s. 6d. for d £7. 10s. softwood. Saltcake at 21s. Bichromate 4½d. Bichromate of soda, 3½d. Carbonate of Chlorate of potash, 6d. Chlorate of baryta, d. Nitrate of baryta, 21s. to 23s. Chloride of hydrate of barium, 12s.; dioxide of barium, 8½d. enic, £11 to £11. 5s. Lump, little offering. Saltpetre: crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton.; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax, unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Montreal potashes, 24s. Chloride of zinc (solid), £18.

## MISCELLANEOUS CHEMICAL MARKET.

THE markets on the whole are without change, and, though we hear of more inquiry in some directions, there does not appear to be any definite movement as yet in the direction of better trade. Soda-ash still continues to find a ready market at 1d. per degree f.o.b., Liverpool. Caustic soda is inclined to recede from the prices obtained at the close of the past week, but the market has been lightened of its stock and quotations are maintained meantime. Sulphate of copper is slow of sale at £21, which is about an average price. Makers' quotations are £22 to £23. Acetates of lime are dull, and prices show no sign of recovery in the absence of demand. Chloride of zinc is still in fair demand. Prussiate of potash is offered freely at the lower prices. Scotch make is held for 6½d. to 7d., but equal quality can be obtained at 6¾d., and Foreign makes are in active competition. Tin crystals are at 9½d., and inclined to droop. Acetates and nitrate of lead find very few buyers at present. Foreign acetates of lead are rather weaker. Potash, carbonate and caustic, are quiet, but without change in prices. Chromic acid and bichromates are in good demand.

## THE TAR PRODUCTS MARKET.

THERE was no difficulty in detecting the weakness of benzol on Tuesday's 'Change at Manchester. Nineties was then reported to be falling from 3s. f.o.b. Goole, while 50's was not worth more than 2s. 2d. naked at works in Manchester, and pure toluene can be bought for less than 2s. With such a declining market, and one in which the speculators are using all their arts and wiles to maintain values, we are still astounded at the prices offering in certain quarters for tar. It may be that some tar distillers see the prospect of a rich harvest ahead, but we hope for their sakes that the prospect is not a mirage, as we do not yet see any signs of permanent improvement. A correspondent writes to us, "As a steadying fact for the trade, will you please report that two-thirds of the Leeds tar has for three years been placed at 21s. per ton," We believe that this quantity has been divided between two distillers, while the other third has been passed to another at 26s.—a price even greater than Mirfield.

Creosote is a shade easier, and though anthracene is not so eagerly inquired after their is no alteration in price, it being the general opinion that anthracene of good quality is all right for some time to come.

## THE SULPHATE OF AMMONIA MARKET.

PRICES have fallen very considerably since our last report, and £11. 12s. 6d. is all that can be obtained at Hull, where there is already a stock of over 600 tons. Leith has fallen to £11. 10s. od., and London to £11. 17s. 6d., while Beckton price has been reduced to £11. 17s. 6d.

# New Companies.

ANGLO-AMERICAN SELF-OPENING SQUARE PAPER BAG MACHINE AND MANUFACTURING COMPANY LIMITED.—Capital, £100,000 in £1 shares.

CROWN LANDS (NORTH WALES) GOLD EXPLORATION COMPANY LIMITED. Capital, £80,000 in £1 shares.

ELECTRIC DATE AND TIME STAMP COMPANY LIMITED.—Capital, £100,000 in £1 shares.

FAWCETT PRESTON AND COMPANY LIMITED, ENGINEERS.—Capital, £100,000 in £10 shares.

HOBB'S PATENT ANTITANNIC INFUSER COMPANY LIMITED.—Capital, £5,000 in £1 shares.

HUTCHINSON PETROLEUM MOTORS LIMITED.—Capital, £60,000 in £1 shares.

"INDUSTRIES" LIMITED.—Capital, £20,000 in £10 shares.

NATIONAL PURE DRINKING WATER AUTOMATIC SUPPLY ASSOCIATION LIMITED.—Capital, £100,000 in £1 shares.

NORMAL FOOD COMPANY LIMITED.—Capital, £250,000 in £5 shares.

SOUTHAMPTON ELECTRIC LIGHT AND POWER COMPANY LIMITED.—Capital, £30,000 in £5 shares.

TAYLOR'S DRUG COMPANY LIMITED.—Capital, £20,000 in £1 shares.

THORNE GAS LIGHT AND COKE COMPANY LIMITED.—Capital, £2,000 in £5 shares.

TOWN HALL BREWERY, SALFORD, LIMITED.—Capital, £20,000 in £5 shares.

# The Patent List.

*The following List has been compiled expressly for* THE CHEMICAL TRADE JOURNAL *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Alpha-naphthylamine-mono-sulpho acid.**—J. Dawson and R. Hirsch. 5484. April 13.
**Apparatus for Heating Water.**—A. Jackson, F. Wear, and G. Wear. 5485. April 13.
**Turbines.**—C. Cadle. 5486. April 13.
**Feeding Pulverised Substances.**—D. E. Thomson. 5494. April 13.
**Pickling Flesh.**—C. J. Cowell. 5495. April 13.
**Steam Boiler Furnaces.**—J. Williamson. 5496. April 13.
**Fire-place for Burning Liquid Fuel.**—A. T. Hunter. 5,508. April 13.
**Preparation of Hydrochloric Acid Gas for Chlorine Making.**—H. W. Deacon and F. Hurter. 5515. April 13.
**Lamps for Lighting.**—F. H. Lenders. 5518. April 13.
**Supplying Furnace Fires with Moistened Air.**—R. le Las and A. Robin. 5527. April 13.
**Plates for Voltaic Batteries.**—E. Hermite, E. J. Paterson, and C. F. Cooper. 5528. April 13.
**Air Propellers.**—P. Scott. 5533. April 14.
**Mordanting Wool with Chromium Compounds.**—E. Knecht and C. Rawson. 5543. April 14.
**Instruments for Calculating Photographic Exposures.**—(Complete Specification.) F. Hurter and V. C. Driffield. 5545. April 14.
**Miners' Lamps.**—(Complete Specification.) C. Wolf and H. Friemann. 5564. April 14.
**Material for Scouring Woollen Fabric.**—A. J. Boult. 5576. April 14.
**Tarpaulins, Roofing Felt, etc.**—W. P. Thomson. 5577. April 14.
**Closing of Tins and Soldered Metal Receptacles.**—C. H. Hummelinck. 5580. April 14.
**Machine for Cleaning Tin Plates.**—W. E. Kochs. 5595. April 14.
**Production of Sulphuretted Hydrogen.**—E. W. Parnell and J. Simpson. 5,600. April 16.
**Production of Spirit from Waste Products of Breweries.**—W. Gerdes. 5612. April 16.
**The Manufacture of Soap.**—W. Rödiger. 5613. April 16.
**Utilisation of Exhaust Steam.**—J. D. Carmichael. 5627. April 16.
**Composition for Cleaning Plate.**—J. Johnson. 5631. April 16.
**Motor Engines.**—R. Humes. 5632. April 16.
**Supplying, Distributing, and Controlling Electricity.**—H. Edmunds. 5640. April 16.
**Safety Poison Bottle.**—O. C. Holt. 5658. April 17.
**Humidifying Air.**—J. Hoyle. 5659. April 17.
**Blast Furnaces.**—W. Evans. 5665. April 17.
**Heating the Feed Supply of Boilers.**—J. Rankine. 5670. April 17.
**Treating, Purifying, and Separating Metals from Waste.**—C. Cheswright. 5673. April 17.
**Artificial Fuel.**—(Complete Specification.) J. Swallow and N. Proctor. 5689. April 17.
**Protector for Thermometers.**—J. Arnold. 5690. April 17.
**Moulds for Casting Metals.**—P. F. Dillon and J. J. Doyle. 5717. April 17.
**Improvement in Bunsen Burners.**—O. Imray. 5722. April 17.
**Production of Chalybeate Waters by Electrolysis.**—W. Webster. 5723. April 17.
**Petroleum Engines.**—C. D Abel. 5724. April 17.
**Separating Grease from Steam.**—(Complete Specification.) H. H. Lake. 5735. April 17.
**Apparatus for Measuring Liquids Flowing through Pipes.**—H. H. Lake. 5738. April 17.
**Calcination of Lead Ores.**—H. H. Lake. 5740. April 17.
**Hydraulic Motors.**—G. Russell. 5752. April 18.
**Feeding Apparatus for Soaping Machines.**—W. Bi April 18.
**Manufacture of Ammonia Salts.**—M. N. d'Andria. 5762.
**Pots for Extracting Decoctions.**—H. Salkeld. 5768. Apri
**Azo Colours.**—E. de Pas. 5781. April 18.
**Electric Arc Lamp.**—W. E. Mountain. 5782. April 18.
**Composition for Ships' Bottoms and the Like.**—M. C. 5787. April 18.
**Non-metallic Porous Bodies for Electro-metallurgic D** H. Steinach. 5790. April 18.
**Manufacture of Soap.**—G. A. Clowes and L. Bryant. 5794.
**Disinfecting Apparatus.**—G. Smith. 5799. April 18.
**Water Gauges for Steam Boilers.**—G. F. Redfern. 5802.
**An Improved Filter.**—R. Cooper, H. R. Clayton, and G. H 5806. April 18.
**Artificial Marble and Stone.**—A. C. Ponton. 5,808. April
**Superheating Steam.**—R. Shackleton. 5812. April 19.
**Printing and Dyeing Cambric.**—W. Green and J. Dou April 19.
**Automatically Removing Scum from Boilers.**—W. 5829. April 19.
**Blue Colouring Matters.**—S. Pitt. 5852. April 19.
**Machinery for Moulding Soap.**—E. G. Scott. 5854. April
**Sodium and Potassium.**—H. Y. Castner. 5856. April 19.
**Anhydrous Aluminium Chlorides.**—H. Y. Castner. 5857.
**Apparatus for the Reduction of Aluminium.**—H. Y. Cas April 19.
**Apparatus for Coating Metals with Tin.**—(Complete Sp A. Gutensohn. 5859. April 19.
**The Preparation of Mineral Substances, and their Co** with Chemical Ingredients or Gases therefrom, and for Precipitating and Disinfecting Sewage Matte Bremner. 5861. April 19.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

MORGAN, LOMAS, & Co., Blackley, near Manchester, matchma
M. THOMPSON & Co., Gateshead, engineers.
DUROSE & BRUCE, Birmingham, brassfounders.
CREWDSON, HARDY, & Co., Middlesbrough, tube manufactu as regards E. Crewdson, jun.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

HOWARTH, ROBERT SCOWCROFT, Cheetham, Manchester, manufacturers' manager.
DIXON, CECIL BERNARDINO, and DIXON, SARA (trading as Cardus), Northam, Southampton, oil-cake and artificial manufacturers.
JOURES, ROBERT, South Shields, chemist.

### Adjudications.

JOURES, ROBERT, South Shields, chemist.

### First Meetings and Public Examinations.

BROADBENT, JOHN (trading as John Broadbent and Co.), Hyde, hat manufacturer. April 27, Official Receiver's Offices, M May 17, Town Hall, Ashton-under-Lyne.
CLARKE, THOMAS, Walsall, currier. May 2, Official Receiv Walsall. May 2, County Court, Walsall.
JOURES, ROBERT, South Shields, chemist. May 3, Official Office, Newcastle-on-Tyne. May 3, County Court, Ne Tyne.
WYATT, HENRY, Denmark-terrace, Southall Green, Southall, late of High-street, Hounslow, oil and colourman. May 4, 10 street, Westminster. April 28, County Court Offices, Winds

### Notices of Dividends.

BORLASE, JAMES, Rimmington, Gisburn, Yorkshire, mine First and final dividend of 3s. 10½d., April 30. Official Chambers, Bradford.
BROOKE, JOSEPH (separate estate), Leeds, and Horsforth, n dyer, trading with W. Lingard. First and final dividend of 30, Official Receiver's Office, Leeds.
LINGARD, WILLIAM (separate estate), Leeds, and Horsforth, n dyer, trading with J. Brooke. First and final dividend of 5s 30, Official Receiver's Office, Leeds.
FOWLE, WILLIAM (trading as the Bracknell Pottery, Brick, Company), formerly of Andover, then of Bracknell, Berkshi as Vincent and Co.), now of Sunningdale, Bracknell, and N Vauxhall, formerly farmer and brick and tile manufact brewer, now brick and tile manufacturer. Final dividend May 8, Mr. M. Nash's, Twyford, Berkshire.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

## THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending April 17th.*

**Acetic Acid—**
Canterbury 2 tons 4 cwt. £50

**Acids—**
Rio de Janeiro 5 cs. £13

**Ammonia Carbonate—**
Bremen 10 cks. £72

**Borax—**
Monte Video 4 cks. £32
Melbourne 1 ton 2 cwt. 38

**Bisulphide of Carbon—**
Rosario 10 cs.

**Brimstone—**
Sydney 150 tons
Savanilla 1 ton 9 cwt.
Demerara 3 cs.

## CHEMICAL EXPORTS—*Continued.*

**Cream Tartar—**

| | | |
|---|---|---|
| Melbourne | 21 kegs. | £126 |
| Otago | 10 ,, 20 cs. | 174 |
| Brisbane | 5 cs. | 33 |
| Pt. Chalmers | 5 c. | 22 |

**Chemicals** (*otherwise undescribed*)—

| | | |
|---|---|---|
| Libau | 17 cks. | £130 |
| Calcutta | 32 pkgs. | 240 |
| Melbourne | 10 ,, | 49 |
| Buenos Ayres | 4 c. | 24 |
| Nagasaki | 50 cs. | 475 |
| Cologne | 10 cks. | 70 |
| Brisbane | 1 cs. | 44 |
| Trinidad | 25 t. 16 c. | 325 |
| Piræus | 51 pkgs. | 24 |
| Wellington | 24 cs. | 95 |
| Bombay | 8 pkgs. | 40 |
| Sydney | 10 bxs. | 37 |
| Adelaide | 67 pkgs. | 227 |
| Natal | 25 cs. | 25 |

**Caustic Soda—**

| | | |
|---|---|---|
| Brisbane | 5 t. 10 c. | £40 |
| Auckland | 3 t. | 22 |

**Collodion—**

| | | |
|---|---|---|
| Hongkong | 1 cs. | £20 |

**Carbolic Powder—**

| | | |
|---|---|---|
| Capetown | 1 ton 10 cwt. | £18 |

**Camphor—**

| | | |
|---|---|---|
| Bombay | 4 cs. | £60 |

**Carbolic Acid—**

| | | |
|---|---|---|
| Buenos Ayres | 1 ton 2 cwt. | £142 |

**Copperas—**

| | | |
|---|---|---|
| Buenos Ayres | 18 cks. | £105 |

**Citric Acid—**

| | | |
|---|---|---|
| Amsterdam | 3 c. | £26 |
| Rotterdam | 5 | 44 |
| Brussels | 10 | 84 |
| Copenhagen | 10 kgs. | 87 |
| Buenos Ayres | 7 c. | 56 |

**Hyposulphite of Soda—**

| | | |
|---|---|---|
| Yokohama | 26 t. 12 c. | £117 |
| San Francisco | 10 t. | 25 |

**Iodoform—**

| | | |
|---|---|---|
| Buenos Ayres | 1 cs. | £231 |

**Iodide Potassium—**

| | | |
|---|---|---|
| Marseilles | 3 c. | £148 |

**Manure—**

| | | |
|---|---|---|
| Carthagena | 26 t. | £370 |
| Alicante | 19 | 153 |
| Gothenburg | 515 | 2,275 |
| Nantes | 29 | 85 |
| Rotterdam | 10 | 34 |
| Dunkirk | 30 | 396 |
| Bordeaux | 100 | 280 |
| Cullera | 685 | 6,900 |
| Ghent | 122 | 1,494 |
| Malaga | 35 | 352 |
| Auckland | 600 bags | 240 |
| St. Kitts | 30 t. 4 c. | 340 |
| Barbadoes | 50 0 | 600 |
| Demerara | 10 3 | 130 |
| Cherbourg | 70 0 | 455 |
| St. Nazaire | 490 bags 100 brls. | 230 |

**Nitric Acid—**

| | | |
|---|---|---|
| Jersey | 24 pkgs. | £65 |

**Nitrate of Silver—**

| | | |
|---|---|---|
| Capetown | 1 cs. | £55 |

**Phosphorus—**

| | | |
|---|---|---|
| Melbourne | 46 cs. | £462 |
| Otago | 34 ,, | 344 |

**Phosphoric Acid—**

| | | |
|---|---|---|
| Brisbane | 20 t. | £340 |
| Demerara | 3 t. | 45 |

**Potassium Permanganate—**

| | | |
|---|---|---|
| Piræus | 15 c. | £67 |

**Sheep Powder—**

| | | |
|---|---|---|
| E. London | 30 cs. | £80 |

**Sulphur—**

| | | |
|---|---|---|
| Penang | 2 t. | £12 |
| Otago | — | 14 |
| Lisbon | 7 t. 10 c. | 68 |
| Mackay | 11 5 | 68 |

**Salammoniac—**

| | | |
|---|---|---|
| Jeddah | 1 t. 1 c. | £34 |
| Colombo | 5 1 | 160 |
| Constantinople | 2 10 | 80 |
| Paris | 2 10 | 81 |

**Sulphuric Acid—**

| | | |
|---|---|---|
| Natal | 20 cs. | £17 |

**Sheep Dip—**

| | | |
|---|---|---|
| Sydney | 1,600 galls. | £400 |
| San Francisco | 13 t. 7 c. | 660 |
| Monte Video | 6 16 | 500 |
| Montego Bay | 250 galls. | 98 |
| Boca | 805 pkgs. | 93 |
| Calcutta | 270 dms. | 110 |
| Algoa Bay | 1 t. | 53 |

**Soda Crystals—**

| | | |
|---|---|---|
| Brisbane | 33 cks. | £14 |

**Sulphate of Ammonia—**

| | | |
|---|---|---|
| Demerara | 70 t. | £884 |
| Ghent | 50 bags | 60 |

**Soda Ash—**

| | | |
|---|---|---|
| Sydney | 25 t. | £127 |
| Auckland | 2 t. 15 c. | 14 |

**Saltpetre—**

| | | |
|---|---|---|
| Otago | 20 kegs. | £22 |
| Savanilla | 4 t. 8 c. | 88 |
| Rio Janeiro | 6 16 | 153 |
| Copenhagen | 1 1 | 23 |
| Sydney | 5 0 | 107 |
| Bahia | 1 8 | 32 |

**Tartaric Acid—**

| | | |
|---|---|---|
| Melbourne | 21 kegs. | £162 |
| Sydney | 8 ,, | 66 |

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## LIVERPOOL.

*Week ending April 18th.*

**Alum—**

| | | |
|---|---|---|
| Malta | 1 t. 10 c. | £7 |
| Syra | 1 1 | 5 |
| Beyrout | 3 3 | 15 |
| Valparaiso | 2 11 | 14 |
| Constantinople | 1 10 | 9 |
| Palermo | 2 2 | 12 |
| Oporto | 5 15 | 34 |
| Salaora | 1 2 | 7 |
| Messina | 1 0 | 6 |
| Seville | 2 0 | 11 |

**Ammonia (carbonate)—**

| | | |
|---|---|---|
| New York | 5 t. 18 c. | £180 |
| Genoa | 1 17 | 63 |
| Barcelona | 1 10 | 42 |
| Iquique | 0 2 | 6 |
| Rouen | 1 6 | 55 |
| Halifax | 1 4 | 45 |

**Arseniate of Soda—**

| | | |
|---|---|---|
| New York | 6 t. 5 c. | £55 |
| Bombay | 4 6 | 49 |

**Ammonia (sulphate)—**

| | | |
|---|---|---|
| Antwerp | 30 t. 0 c. | £350 |
| Ghent | 11 10 | 138 |
| St. Nazaire | 10 0 | 120 |

**Ammonia (muriate)—**

| | | |
|---|---|---|
| Philadelphia | 23 tons 13 cwt. | £535 |

**Bicarbonate of Soda—**

| | | |
|---|---|---|
| Antwerp | 100 kegs. | |
| Barcelona | 50 ,, | |
| Genoa | 20 ,, | |
| Halifax | 5 brls. 1 ck. | |
| Seville | 40 ,, | |
| Marseilles | 89 kegs. | |
| Nantes | 55 ,, | |
| Venice | 60 ,, | |

**Brimstone—**

| | | |
|---|---|---|
| Mexico | 30 tons. | £139 |

**Borax—**

| | | |
|---|---|---|
| Montreal | 3 t. 4 c. 0 q. | £96 |
| Antwerp | 0 14 2 | 18 |
| Savanilla | 0 2 3 | 5 |

**Blood (dried)—**

| | | |
|---|---|---|
| Grand Canary | 2 tons. | £16 |

**Bleaching Powder—**

| | | |
|---|---|---|
| Baltimore | 211 cks. | |
| Bombay | 15 cs. | |
| Boston | 814 cks. | |
| Carthagena | 20 ,, | |
| Genoa | 25 ,, | |
| Havre | 25 ,, | |
| Leghorn | 27 pkgs. | |
| Malaga | 2 pps. | |
| Nantes | 15 cks. | |
| New York | 82 ,, | |
| Oporto | 16 ,, | |
| Passages | 32 pps. | |
| Vera Cruz | 11 brls. | |

**Baryta Chlorate—**

| | | |
|---|---|---|
| Constantinople | 2 cwt. 1 qr. | £10 |

**Bone Waste—**

| | | |
|---|---|---|
| Rouen | 11 tons 1 cwt. | £65 |

**Chlorate of Potash—**

| | | |
|---|---|---|
| Barcelona | 2 t. 8c. | £128 |
| Hamburg | 4 4 | 231 |
| Rotterdam | 6 5 | 342 |
| San Juan | 1 17 | 104 |
| Boston | 2 0 | 103 |
| Constantinople | 1 13 | 88 |
| Valencia | 0 6 | 18 |
| New York | 7 10 | 450 |
| Lisbon | 0 12 | 42 |

**Copper Sulphate—**

| | | |
|---|---|---|
| Genoa | 12 t. 1 c. | £250 |
| Nantes | 9 15 | 205 |
| Valparaiso | 25 4 | 542 |
| Rosario | 1 19 | 25 |
| Rouen | 31 7 | 637 |

**Collodion—**

| | | |
|---|---|---|
| Shanghai | 11 cwt. | £114 |

**Caustic Soda—**

| | | |
|---|---|---|
| Alexandria | 68 dms. | |
| Algoa Bay | 20 ,, 7 cs. | |
| Algiers | 15 ,, | |
| Alicante | 20 ,, | |
| Antwerp | 43 ,, | |
| Barcelona | 30 brls. 130 dms. | |
| Batoum | 1,107 dms. | |
| Beyrout | 5 ,, | |
| Bilbao | 100 ,, 34 brls. | |
| Bombay | 8 ,, | |
| Bordeaux | 15 ,, | |
| Boston | 150 ,, | |
| Buenos Ayres | 150 ,, | |

## CHEMICAL EXPORTS—*Continued.*

**Caustic Soda.**—*Continued.*

| | |
|---|---|
| Cadiz | 14 brls. 20 dms, |
| Calcutta | 239 dms. |
| Canada | 20 ,, |
| Carthagena, W.I. | 25 brls. |
| Corfu | 40 dms. |
| Galatz | 70 ,, |
| Geelong | 26 ,, |
| Genoa | 104 ,, |
| Ghent | 36 ,, |
| Hamburg | 56 ,, |
| Havana | 50 ,, |
| Hiogo | 300 ,, |
| Kiobe | 50 ,, |
| Lisbon | 103 ,, |
| Madrid | 25 ,, |
| Malaga | 116 ,, |
| Malta | 15 ,, |
| Manila | 100 ,, |
| Marseilles | 170 ,, |
| Maracaibo | 12 ,, |
| Matanzas | 25 ,, |
| Melbourne | 125 ,, |
| Monte Video | 40 ,, |
| Naples | 52 ,, |
| Newfairwater | 220 ,, |
| New Orleans | 50 ,, |
| New York | 1,116 ,, |
| Odessa | 250 ,, |
| Oporto | 10 ,, |
| Passages | 6 ,, |
| Penang | 10 ,, |
| Philadelphia | 149 ,, |
| Port Elizabeth | 21 bxs. |
| Portland, Me. | 5 dms. |
| Rio Grande do Sul | 50 ,, |
| Rotterdam | 20 ,, |
| Rouen | 311 ,, |
| San Sebastian | 30 brls. |
| Santander | 108 dms. |
| Seville | 44 brls. 353 ,, |
| Stettin | 59 ,, |
| Talcahuano | 40 ,, |
| Tarragona | 32 ,, |
| Trieste | 10 ,, |
| Tunis | 20 ,, |
| Venice | 28 ,, |
| Vera Cruz | 10 ,, |
| Yokohama | 650 ,, |

**Carbolic Crude—**

| | | |
|---|---|---|
| New York | 12 cwt. | £27 |

**Carbolic Acid—**

| | | |
|---|---|---|
| Genoa | 1 t. 16 c. | £223 |
| Hamburg | 10 14 | 1,608 |
| New York | 2 10 | 303 |
| Rouen | 1 9 | 16 |

**Carbolic Powder—**

| | | |
|---|---|---|
| Hamburg | 8 t. 7 c. | £1,247 |

**Charcoal—**

| | | |
|---|---|---|
| Hamburg | 30 t. 0 c. | £90 |
| Rouen | 20 11 | 26 |

**Chemicals** *(otherwise undescribed)*—

| | | |
|---|---|---|
| Hamburg | 0 t. 11 c. | £16 |
| Antwerp | 15 9 | 464 |
| Genoa | 0 10 | 16 |
| New York | 0 19 | 14 |
| Rotterdam | 20 11 | 147 |
| Vera Cruz | 14 cks. | 56 |

**Copperas—**

| | | |
|---|---|---|
| Piræus | 2 t. 7 c. | £4 |
| Calcutta | 12 13 | 37 |
| Oporto | 4 17 | 9 |

**Copper Arsenate—**

| | | |
|---|---|---|
| Constantinople | 1 cwt. | £6 |

**Calomel—**

| | | |
|---|---|---|
| Constantinople | 1½ qr. | £8 |

**Caustic Potash—**

| | | |
|---|---|---|
| Algoa Bay | 1 t. 1 c. | £23 |
| Otago | 1 1 | 21 |

**Disinfectants—**

| | | |
|---|---|---|
| Calcutta | 30 tons 3 cwt. | £765 |

**Ether—**

| | | |
|---|---|---|
| Alexandria | 1 ton. | £8 |

**Epsom Salts—**

| | |
|---|---|
| Bombay | 7 cks. |
| Rio de Janeiro | 80 kgs. |
| Seville | 10 brls. |

**Guano—**

| | | |
|---|---|---|
| Bilbao | 1 t. 8 c. | £11 |
| Valencia | 200 0 | 1,650 |

**Glycerine—**

| | | |
|---|---|---|
| Paris | 5 tons | £200 |

**Glauber Salts—**

| | | |
|---|---|---|
| Lisbon | 1 ton. 16 cwt. | £5 |

**Iron Oxide—**

| | | |
|---|---|---|
| Philadelphia | 3 tons. 10 cwt. | £60 |

**Magnesium Chloride—**

| | | |
|---|---|---|
| New York | 6 t. 10 c. | £16 |
| Bombay | 5 10 | 13 |

**Magnesia—**

| | |
|---|---|
| Havre | 9 cs. |
| Seville | 20 |

**Manure—**

| | | |
|---|---|---|
| Bordeaux | 150 t. | £400 |
| Valencia | 10 | 24 |
| St. Nazaire | 100 | 300 |

**Oxalate of Soda—**

| | | |
|---|---|---|
| Constantinople | 1 cwt. | £6 |

**Oxalic Acid—**

| | | |
|---|---|---|
| Boston | 18 tons 2 cwt. | £507 |

**Pitch—**

| | |
|---|---|
| Antwerp | 569 t. |
| Bordeaux | 230 |
| Havre | 100 |

**Phosphorus—**

| | | |
|---|---|---|
| La Guayra | 1 c. 3 q. | £22 |
| San Juan | 2 1 | 32 |

**Potashes—**

| | | |
|---|---|---|
| Catania | 2 t. 15 c. 2 q. | £75 |
| Monte Video | 1 8 1 | 45 |
| Antwerp | 1 1 0 | 25 |
| Amsterdam | 0 17 2 | 21 |

**Picric Crystals—**

| | | |
|---|---|---|
| Hamburg | 1 ton 10 cwt. 1 qr. | £233 |

**Potassium Bichromate—**

| | | |
|---|---|---|
| Constantinople | 0 t. 5 c. | £11 |
| Rouen | 11 14 | 340 |

**Potassium Cyanide—**

| | | |
|---|---|---|
| Halifax | 150 lb. | £10 |

**Potash Salts—**

| | | |
|---|---|---|
| Bombay | 2 tons 10 cwt. | £8 |

**Salt—**

| | |
|---|---|
| Aarhuus | 431 t. |
| Boca | 27 |
| Boston | 246 |
| Brisbane | 160 |
| Buguma | 18 |
| Chicago | 117 |
| Ghent | 150 |
| Halifax | 1,692 |
| Melbourne | 70 |
| Newport News | 130 |
| Newcastle | 193 |
| Paspebiac | 573 |
| Perce | 110 |

**Salt.**—*Continued.*

| | |
|---|---|
| Portland, Me. | 525 |
| Portland, Oregon | 350 |
| Quebec | 1,945 |
| St. John, N.B. | 500 |
| Saltpond | 13 |
| San Francisco | 92 |
| Santa Catherina | 0 11 c. |
| Stockholm | 15 |
| Talcahuano | 2 |
| Trinidad | 3 |
| Valparaiso | 4 |
| Abonnema | 75 |
| Calcutta | 8,068 |
| East London | 44 |
| Lagos | 200 |
| New Richmond | 60 |
| Old Calabar | 40 |
| Opobo | 187 |

**Soda Ash—**

| | |
|---|---|
| Baltimore | 236 cks. 847 tcs. |
| Barcelona | 40 brls. |
| Boston | 301 cks. 354 tcs. 900 bgs. 500 |
| Constantinople | 10 brls. |
| Genoa | 86 ,, |
| Madeira | 35 ,, |
| Newport News | 192 tcs. |
| New York | 606 ,, 179 cks. |
| Oporto | 10 pps. 10 cks. |
| Philadelphia | 93 cks. 536 tcs. |
| Portland, Me. | 73 tcs. |
| Rio Janeiro | 100 brls. 2 tcs. |
| Rosario | 50 ,, |
| Rouen | 40 cks. |
| Smyrna | 100 brls. |
| Vera Cruz | 20 cks. |

**Silicate of Soda—**

| | |
|---|---|
| Barcelona | 60 brls. |
| Genoa | 4 cks. |
| Melbourne | 5 ,, |
| Passages | 10 ,, |
| Santander | 25 ,, |
| Valencia | 10 brls. |
| Venice | 6 ,, |

**Soda Crystals—**

| | |
|---|---|
| Boston | 280 brls. |
| Constantinople | 83 ,, |
| Halifax | 3 t. 18 c. |
| Bilbao | 18 cks. |
| Malta | 60 brls. |
| Singapore | 10 cks. |

**Salammoniac—**

| | |
|---|---|
| Antwerp | 1 t. 0 c. |
| Galatz | 0 15 |
| Philadelphia | 4 18 |
| Salonica | 0 10 |

**Saltpetre—**

| | |
|---|---|
| Parahyba | 2 t. 6 c. |
| Syra | 8 5 |
| Vera Cruz | 0 10 |

**Sheep Dip—**

| | |
|---|---|
| East London | 2 tons 9 cwt. |

**Sheep Wash—**

| | |
|---|---|
| New York | 11 tons. |

**Sulphur—**

| | |
|---|---|
| St. John, N.B. | 2 t. 11 c. |
| Pernambuco | 5 14 |
| Halifax | 0 12 3 q. |

**Sodium Nitrate—**

| | |
|---|---|
| Carthagena | 3 t. 1 c. |
| Constantinople | 0 7 3 q. |

**Sugar of Lead**

| | |
|---|---|
| Lisbon | 16 c. 2 q. |

**Saltcake—**

| | |
|---|---|
| Boston | 21 t. 8 c. |
| Baltimore | 111 11 |

## CHEMICAL EXPORTS—*Continued.*

**Strontia Carbonate—**
Constantinople 4 cwt. £6

**Strontia Nitrate—**
Constantinople 8 cwt. £23

**Salts Tartar—**
Barcelona 6 cwt. £7

**Sodium Sulphide—**
Halifax 6 cwt. £12

**Soap Powder—**
Havre 1 ton 5 cwt. £43

**Sodium Bichromate—**
Rouen 5 tons £183

**Sodium Sulphate—**
Seville 1 ton 3 cwt. £5

**Tar—**
Brass 5 cks.
Harbour Grace 17 brls.
Honolulu 10 brls. 10 dms.
St. Johns, Nfld. 60 brls.
Sierra Leone 25 ,,

**Zinc Chloride—**
Bombay 3 tons £50

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## GLASGOW.

*Week ending April 21st*

**Benzol—**
Rotterdam 23 dms. £545

**Bichromate of Potash—**
Rotterdam 17 cks. £284
Antwerp 1 t 8c. 25
Lisbon 1 16 75

**Bichrome—**
Antwerp 25 t. 3 c. £943
Gothenburg 0 15 26

**Caustic Soda—**
Calcutta 2 tons 6 cwt. £21

**Chemicals—**
Lisbon £48

**Pitch—**
Calcutta 5 tons 13 cwt. £8

**Soda Ash—**
New York 36 tons 19 cwt. £157

**Sulphuric Acid—**
Madras 10 tons 17 cwt. £78

**Soda—**
Madras 8 tons 12 cwt. £28

**Tar—**
Calcutta 57 tons £90

**Vitriol—**
Lisbon 2 ton 7 cwt. £21

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## HULL.

*Week ending April 17th.*

**Alkali—**
Bergen 17 dms.

**Bleaching Powder—**
Venice 30 cks.

**Chemicals** *(otherwise undescribed)*
Antwerp 4 cs. 7 cks.
Bari 70 pkgs. 170 cks.
Boston 100 brls.
Bergen 40 cks.
Bombay 20 ,,
Bremen 2 cs. 25 pkgs. 12 cks.
Christiania 8 pkgs. 289 cks.
**Chemicals.**—*Continued.*
Dantzic 50 pkgs. 4 cks.
Drontheim 5 cks.
Granville 134 bags.
Gothenburg 5 pkgs. 3 cks.
Ghent 34 pkgs.
Hamburg 25 pkgs. 10 cks. 133 cs.
Lisbon 34 cks.
Libau 7 cks. 3 cs.
New York 50 cs.
Palermo 1 ck.
Rotterdam 171 pkgs. 122 cks. 39 cs.
Rouen 22 cks.
Stettin 15 pkgs. 1 ck.

**Caustic Soda—**
Dunkirk 19 dms.
Libau 65 ,,

**Manure—**
Antwerp 1,689 bags.
Esbjerg 50 tons.
Ghent 1,990 bags.
Gothenburg 30 tons.

**Pitch—**
Antwerp 450 tons.

**Tar—**
Bergen 1 ck.
Drontheim 5 cks.
Hamburg 14 ,,

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## TYNE.

*Week ending April 21st.*

**Aluminium Hydrate—**
Antwerp 1 c. 1 q.

**Aluminium Sulphate—**
Antwerp 19 c. 3 q.

**Alkali—**

| | | |
|---|---|---|
| Hamburg | 10 t. | 10 c. |
| Aarhuus | 2 | 6 |
| Rotterdam | 7 | 13 |
| Stettin | 26 | 16 |
| Amsterdam | 95 | 6 |
| Leghorn | 3 | 11 |

**Antichlor—**
Rotterdam 1 ton.

**Arsenic—**
Leghorn 1 ton 3 cwt.

**Arsenic (ground)—**
Gothenburg 7 cwt.

**Bleaching Powder—**

| | | |
|---|---|---|
| Antwerp | 180 t. | 8 c. |
| Hamburg | 30 | 3 |
| Gothenburg | 36 | 7 |
| Rotterdam | 18 | 3 |
| Copenhagen | 2 | 5 |
| Genoa | 0 | 10 |
| Amsterdam | 31 | 18 |
| Stettin | 233 | 18 |
| Lisbon | 11 | 0 |

**Barium Nitrate—**
Genoa 19 cwt. 1 qr.

**Barium Chloride—**
Genoa 1 ton 2 cwt. 3 qr.

**Barium Carbonate—**
Stettin 111 tons.

**Caustic Soda—**

| | | |
|---|---|---|
| Antwerp | 3 t. | 4 c. |
| Hamburg | 14 | 18 |
| Genoa | 2 | 18 |
| Amsterdam | 2 | 8 |
| Stettin | 9 | 8 |
| Copenhagen | 5 | 5 |
| Gothenburg | 35 | 6 |

**Copperas—**
Stettin 5 tons. 19 cwt.

**Iron Oxide—**
Helsingborg 3 cwt.

**Manure—**
Esbjerg 110 tons
Helsingborg 25
Frederikshavn 243

**Magnesia—**
Genoa 10 cwt.

**Magnesium Carbonate—**
Genoa 5 cwt.

**Phosphorus—**
Malmo 6 cwt.

**Potassium Chlorate—**

| | | | |
|---|---|---|---|
| Gothenburg | 8 t. | 3 c. | 1 q. |
| Rotterdam | 1 | 0 | 0 |
| Copenhagen | 5 | 0 | 0 |
| Genoa | 1 | 4 | 0 |
| Stettin | 2 | 0 | 0 |

**Soda—**

| | | |
|---|---|---|
| Esbjerg | 15 t. | 10 c. |
| Christiania | 5 | 8 |
| Aarhuus | 149 | 10 |
| Harlingen | 70 | 7 |
| Rotterdam | 31 | 7 |
| Genoa | 17 | 6 |
| Amsterdam | 112 | 4 |
| Gothenburg | 5 | 0 |

**Soda Ash—**

| | | |
|---|---|---|
| Hamburg | 39 t. | 18 c. |
| Frederikshavn | 1 | 5 |
| Genoa | 1 | 4 |
| Amsterdam | 9 | 9 |
| Naples | 40 | 6 |
| Stettin | 39 | 18 |
| Gothenburg | 63 | 13 |
| Lisbon | 84 | 12 |

**Sodium Bicarbonate—**

| | | |
|---|---|---|
| Hamburg | 5 t. | 10 c. |
| Christiania | 1 | 10 |
| Copenhagen | 1 | 0 |
| Genoa | 2 | 3 |
| Stettin | 0 | 10 |

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## GOOLE.

*Week ending April 11th.*

**Benzol—**
Hamburg 40 cks.
Rotterdam 143 ,,

**Chemicals** *(otherwise undescribed)—*
Boulogne 8 cks.
Calais 60 ,,
Hamburg 22 ,,
Rotterdam 22 ,, 43 pkgs.
Rouen 10 ,,

**Coal Products—**
Dunkirk 51 cks.
Rotterdam 50 ,,

**Manure—**
Antwerp 160 bags.
Dunkirk 89 ,,
Ghent 517 ,,

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## GRIMSBY.

*Week ending April 11th.*

**Chemicals** *(otherwise undescribed)—*
Dieppe 1 cs. 14 cks. 16 btls.
Hamburg 0 21 15 dms.

# PRICES CURRENT.

[THURSDAY, April 26, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... per cwt. | 0 | 8 | 9 |
| ,, Glacial ... per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... per lb. | 0 | 0 | 6 |
| Fluoric ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... per lb. | 0 | 0¼ | 2¼ |
| Nitrous ... ,, | 0 | 0 | 2 |
| Oxalic ... ,, | 0 | 0 | 3½ |
| Picric ... ,, | 0 | 1 | 6 |
| Sulphuric (fuming 40 %) ... per ton | 15 | 0 | 0 |
| ,, (monohydrate) ... ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ,, | 0 | 1 | 6 |
| Arsenic, white powdered... ... per ton | 11 | 7 | 6 |
| Alum (loose lump) ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, ·880=28°... ... per lb. | 0 | 0 | 3⅛ |
| ,, =24°... ,, | 0 | 0 | 1⅝ |
| ,, Carbonate ... ,, | 0 | 0 | 3⅛ |
| ,, Muriate ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... per ton. | 42 | 10 | 0 |
| ,, ,, (pure) ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 11 | 17 | 6 |
| ,, ,, (grey), Hull ... ,, | 11 | 12 | 6 |
| Aniline Oil (pure) ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ,, | 0 | 0 | 8½ |
| Antimony ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... per ton | 7 | 10 | 0 |
| ,, Carbonate (native) ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 %... ... ,, | 7 | 8 | 9 |
| ,, Liquor, 7 % ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ,, | 11 | 15 | 0 |
| Calcium Chloride ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... | ,, 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... per lb. | 0 | 0 | 9 |
| Magenta ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ...per gallon | 0 | 3 | 0 |
| ,, 50/90 ,, ... ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 2½ |
| ,, (crude 60°) ... ...per gallon | 0 | 4 | 0 |
| Creosote (ordinary) ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 1 |
| Grease Oils, 22° Tw. ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) ... ,, | 0 | 0 | 1⅜ |
| Copper (Chili bars) ... ... per ton | 80 | 7 | 6 |
| ,, Sulphate ... ,, | 21 | 0 | 0 |
| ,, Oxide (copper scales) ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ,, | 80 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ... ,, | 15 | 5 | 0 |
| ,, Litharge Flake (ex ship) ... ,, | 16 | 5 | 0 |
| ,, Acetate (white, ,, ) ... ,, | 26 | 0 | 0 |
| ,, ,, (brown, ,, ) ... ,, | 21 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 10 | 0 |
| ,, Nitrate ... ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) ... ,, | 9 | 0 | 0 |
| ,, ,, (grey) ... ,, | 13 | 5 | 0 |
| Magnesium (ribbon and wire) ... per oz. | 0 | 2 | 3 |
| ,, Chloride ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... ,, | 1 | 17 | 6 |
| ,, Hydrate ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ,, | 17 | 10 | 0 |
| ,, Borate ... ,, | 2 | 2 | 6 |
| ,, Ore, 70 % ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ... ...per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent ... ,, | 0 | 4 | 0 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 6 |
| **Oils:—** | | | |
| Castor ... per cwt. | 1 | 3 | 0 |
| Cotton-seed ... per ton | 21 | 10 | 0 |
| Linseed ... ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ...per gallon | 0 | 0 | 6 |
| ,, American ... ,, | 0 | 0 | 6½ |
| Potassium (metal) ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... per cwt. | 0 | 16 | 6 |
| ,, Chlorate ... per lb. | 0 | 0 | 5⅜ |
| ,, Cyanide, 98 % ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) ... per cwt. | 1 | 2 | 6 |
| ,, Permanganate ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... per lb. | 0 | 0 | 6¾ |
| ,, Sulphate, 90 % ... per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % ... ,, | 8 | 10 | 0 |
| Silver (metal) ... per oz. | 0 | 3 | 6½ |
| ,, Nitrate ... ,, | 0 | 2 | 7½ |
| Sodium (metal)... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) ... ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ,, | 19 | 10 | 0 |
| ,, Chlorate ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... per ton. | 30 | 0 | 0 |
| ,, Bichromate ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda)... per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 7 | 6 |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 15 | 0 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 15 | 0 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 12 | 6 |
| ,, Bicarbonate ... ,, | 5 | 0 | 0 |
| ,, Hyposulphite ... ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 ... ,, | 10 | 0 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 10 | 0 |
| ,, Nitrite, 98% ... per ton | 28 | 0 | 0 |
| ,, Phosphate... ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 5 | 0 |
| ,, Sulphate (Salt-cake)... ... ,, | 1 | 1 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 10 | 0 |
| ,, Sulphide ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... per cwt. | 0 | 14 | 0 |
| ,, Cane ... ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium ... per lb. | 0 | 0 | 7½ |
| ,, Barium ... ,, | 0 | 0 | 5⅜ |
| ,, Copper, 60% ... ,, | 0 | 0 | 8½ |
| Sulphur (Flowers) ... per ton | 9 | 0 | 0 |
| ,, (Roll Brimstone) ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) ... ,, | 2 | 5 | 0 |
| Tallow ... ,, | 26 | 0 | 0 |
| Tin (metal) ... ,, | 150 | 0 | 0 |
| ,, Crystals ... per lb. | 0 | 0 | 9½ |
| Zinc (Spelter) ... per ton | 17 | 10 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 12 | 6 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, May 5, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Our Registered Telegraphic Address is—

**"Expert, Manchester."**

The yearly Subscription, commencing at any date, to the *Chemical Trade Journal*,—payable in advance,—including postage to any part of the world, is 10s. 6d. Readers will oblige by making their remittances for subscriptions by Postal or Post Office Order, crossed. The charge for a Postal Order for 10s. 6d. is one penny.

Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

**Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application**



## BLEACHING BY ELECTRICITY.

ON page 99 of our first volume we called special attention to the process of bleaching by electricity, or to be more accurate, to the process of so preparing a solution of chloride of magnesium by the aid of an electric current, that such a liquid duly prepared might be employed in the place of chloride of lime for all or most of those many purposes to which that chemical is now put to use in the arts.

The major portion of chloride of lime or bleaching powder which is now made in those works also producing Leblanc soda finds its way into the arts as a bleaching agent, and as such is well known to the bleachers, dyers, and papermakers all over the civilised world, and when it is described that it is possible to produce a bleaching agent having similar properties to the lime salt from a compound of magnesium the subject of our notice now will not require any further introduction.

At the time of our first notice in August last two notable papers had been given forth to the world; the first by Messrs. Cross and Bevan, of New Court, Lincoln's Inn, London, wherein the merits of the Hermite process, as this process of electrolytic bleaching is named, was freely discussed and recommended in glowing terms as being a much cheaper process for ordinary bleaching than the old method of using bleaching powder. Contrasted with this, Dr. F. Hurter, of Widnes, a chemist well versed in all chemical methods, and especially in the manufacture of chlorine, issued to the world another paper, in which Messrs. Cross and Bevan's methods were severely criticised, it being finally stated by Dr. Hurter that the actual cost of chlorine-bleach by the electrolytic method must be many times that at which Messrs. Cross and Bevan had laid it. Like wise men the two chemists thus attacked contrived to hold their peace until they had subjected Dr. Hurter's criticisms to the rigid scrutiny of laboratory experiment, and until the process had been sufficiently tried upon the large scale to warrant an accurate opinion being given. This has now been done; not only have Messrs. Cross and Bevan submitted each step of the process to rigid test in the laboratory, but a trial has been made upon the industrial scale at a linen yarn bleach works in Belfast, and these trials have been eminently satisfactory.

We pointed out on page 100 of our last volume, that for the process to be a success, the secondary decompositions known to take place must be suppressed. Dr. Hurter showed that magnesium hypochlorite was extremely liable to be further oxidised to chlorate, and this chlorate even to perchlorate, but if this circumstance was merely accidental, it behoved the patentees to show under what conditions these so-called accidents were likely to occur, in order that intending users might not be led astray. This has now been done, and the masterly paper read by Messrs. Cross and Bevan, on the 23rd ult., before the London section of the Society of Chemical Industry, should dispel the cloud which at one time hung over the electrolytic method.

Industrial applications of chemical methods should have taught us a lesson—the ammonia-soda process imagined by Hemming and Dyer took fifty years to perfect, and no doubt many very sanguine chemists had pronounced the process unworkable; the manganese recovery process took half a century to work out, while the recovery of sulphur from alkali waste had a similar fate; it is not surprising, therefore, to find an electrolytic process imagined by Watt in 1851, not brought to perfection in 1887.

But Messrs. Cross and Bevan in their paper have clearly told us what are the necessary conditions—careful attention to the quantity of electricity measured in ampères passed

between a given surface of electrodes in a given time. All this is simple enough, but it had to be discovered, and there is but little doubt that the process known as the "Hermite" is now on the Royal road to success. The application of the electrolysed solution to the various processes of bleaching, whether it be for papermaking, or the ordinary business of the bleacher, presents no insuperable difficulties, and now that the veil has been lifted, we shall wait to see what we shall see.

The practical bleacher as a rule does not care for equations, H. O. and Cl are in his mind mystic symbols: he says in his practical way, How much can I bleach, in what time, and at what cost? And, provided these replies are more favourable than with bleach of the old kind, he is certain to look into the matter sooner or later.

These questions have been answered by the large scale experiments at Belfast, where bleaching powder is stated to have cost 14s. 4d. to do a certain amount of work, while a similar quantity was executed by electrolytic solution for 4s. 8d.

It does not need us to ramble away into the theoretical aspects of the question, the subject has acquired such a degree of importance that the production of a bleaching fluid by means of electricity cannot be well overlooked by those whose daily work is bleaching, and if Messrs. Cross and Bevan's later calculations can be sustained, there is no doubt that the Hermite process has a great future before it.

# Parliamentary Jottings.

### THE ENGINE AND BOILERS BILL.

On the order of the day for the second reading of the Steam Engine and Boilers Bill, Mr. Broadhurst trusted the House would agree to the second reading. Great saving of life and property had resulted from the examination of marine engineers, and it could not be doubted that at least equal advantage would result from compelling those who are in charge of engines in our large towns to submit to a similar examination, and take out a certificate of competence.—Sir M. Hicks-Beach said that he was sure they were all desirous to do everything they could to diminish the danger of accidents in connection with steam engines, but he doubted whether the bill before the House would tend to attain that object.—Mr. Addison moved that the bill should be read a second time that day six months. He condemned the measure as an objectional and unnecessary interference with personal liberty.—The discussion was continued by Mr. F. Powell, Mr. Winterbotham, Mr. Jackson, Mr. Fenwick, and other members. Ultimately the House divided, when there were:—For the second reading, 96; against, 147; majority, 51. The bill was therefore rejected.

### IMPORTS OF PETROLEUM.

Mr. Lafone asked the Secretary of State for the Home Department whether he was aware that petroleum was now coming in bulk from Russia in tank steamers right up the Thames as high as the Regent's Canal Dock, and that they discharged with fires alight on board, frequently working night and day; that these steamers often carried upwards of 1,000 barrels, and that so little precaution was exercised in the river that two steamers went into one of the up-town docks lately with inflammable oil in barrels below 73° Fahr., and stored the oil on the quay; and whether he would take immediate steps to bring in a bill to regulate the storage of petroleum.

### PATENT ASSIGNMENTS.

In answer to Mr. P. Stanhope, the Chancellor of the Exchequer said,—Some misapprehension has existed as to the proper stamp duty chargeable upon instruments which are in form agreements affecting patents, but which operate as equitable assignments of the patents. If the instruments were merely chargeable as agreements, the duty on them would be sixpence only; but in cases where they operate as assignments they are chargeable with *ad valorem* duty as assignments on sale of mortgage, or with a duty of 10s. as assignments or otherwise, as the case may be. In consequence of an erroneous opinion, many instruments which were chargeable as assignments have been registered at the Patent Office when bearing the duty of sixpence only; and when the Inland Revenue authorities became aware of this they drew the attention of the officials of the Patent Office to the matter, and to their duty under the Stamp Act. The *ad valorem* duty of 10s. per cent. upon the consideration for the assignment on sale, or of 2s. 6d. per cent. upon the mortgage money in the case of mortgage, is not, I think, such as to operate in such a manner as the hon. member appears to forebode. But, however that may be, the Inland Revenue Department have only been executing the law as it now stands in the action they have taken, and have acted under the statutory authority vested in the Board.

### ARCHITECTS' REGISTRATION.

Col. Duncan moved the second reading of the Architects' Registration Bill, and stated that its object was a very simple one. At present there was nothing to prevent a man calling himself an architect, surveyor, or civil engineer, and his desire was to ensure to the public the means of distinguishing between a man who was trained in his profession and one who was not.—Sir Walter Foster quite agreed that there was a necessity for making architects and surveyors better acquainted with sanitary matters, but he did not see anything in the bill which would insure that result.—Mr. Gill entered his protest against the bill, which he regarded as unnecessary, uncalled for, and invidious.—Mr. Murphy approved of the object of the bill.—The Attorney-General was sure that anyone who was acquainted with the professions dwelt with must feel that the bill was unnecessary, that it imposed needless restrictions, and that it would not accomplish the object with which it had been introduced. It would be a monstrous thing to enact that persons now practising as architects and surveyors should cease to do so unless they were registered.—Sir L. Playfair said that he thought it would be dangerous to pass a bill which met with so much opposition.—Col. Duncan withdrew the bill, and the order of the day was discharged.

### THE PATENTS ACT.

Mr. Ritchie informed Sir Henry Roscoe that it was the intention of the Government to introduce a bill to amend the Patents Act in some minor particulars.

### MEXICAN PULQUE.

Dr. Cameron asked the Secretary to the Treasury whether the Commissioners of Inland Revenue had ordered an importer of Mexican pulque in Edinburgh to take out a wine and spirit license as a condition of his being allowed to retail that beverage? Would he explain under what provisions of the law the demand has been made? Whether the alcoholic strength of koumiss is equal or superior to that of pulque, and whether any wine and spirit license has ever been acquired in the case of persons retailing koumiss in London? Mr. Jackson said that the Board of Inland Revenue had had notified to them that this alcoholic beverage could only be sold by the holder of a spirit license. It contained 10 per cent. of proof spirit. The alcoholic strength of koumiss was considerably less than that of pulque. No person retailing koumiss required a license.—Dr. Cameron asked what was the limit of proof spirit for which a license was required.—Mr. Jackson said he did not know, and asked for notice.—Dr. Cameron said he would repeat the question.

### GOLD IN WALES.

Mr. Watt asked the First Lord of the Treasury whether his attention had been called to the large find of gold in certain parts of Wales, the yield equalling, it was said, the best gold mines in the world; and whether the precious metals so found, or their equivalent value, were by law the property of the Crown under Acts I Will. and Mary, s. 2, c. 30; 5 and 6 Will. and Mary, c. 6; and 55 George III., c. 134; and if so, whether the Government were taking any, and if so, what steps to insure that the gold so found, or its equivalent value, was secured to the State in accordance with the provisions of the law.—Mr. W. H. Smith: Notice has been given by the Commissioners of Woods and Forests that mines Royal of gold and silver, wherever found, belong to the Crown and are not to be worked without authority from the Commissioners. The Commissioners are taking steps to insure that a fair equivalent for the gold found in Wales is secured for the Crown and the public.

## THE U.S. AMENDED TARIFF BILL.

FOLLOWING we print so much of the bill presented to the House on the 2nd instant as affects the chemical trades, it being the Mills Bill as modified or amended by the Committee of Ways and Means, and is entitled "A Bill to Reduce Taxation and Simplify the Laws in Relation to the Collection of the Revenue:"

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That on and after the first day of July, eighteen hundred and eighty-eight, the following articles mentioned in this section, when imported, shall be exempt from duty:—

Beeswax.
Glue.
Gelatine, and all similar preparations.
Glycerine, crude, brown, or yellow, of the specific gravity of 1·25 or less at a temperature of 60° Fahrenheit, not purified by refining or distilling.
Fish-glue, or isinglass.
Phosphorus.
Soap stocks, fit only for use as such.
Soap, hard and soft, all which are not otherwise specially enumerated or provided for.
Sheep dip.
Extract of hemlock, and other bark used for tanning.
Indigo, extracts of, and carmined.
Iodine, resublimed.
Liqorice, juice.
Oil, croton.
Hempseed and rapeseed oil.
Oil, cottonseed.
Petroleum.
Alumina—alum, patent alum, alum substitute, sulphate of alumina, and aluminous cake, and alum in crystals or ground.
All imitations of natural mineral waters, and all artificial mineral waters.
Baryta, sulphate of, or barytes, unmanufactured.
Boracic acid, borate of lime, and borax.
Copper, sulphate of, or blue vitriol.
Iron, sulphate of, or copperas.
Potash, crude, carbonate of, or fused and caustic potash.
Chlorate of potash and nitrate of potash, or saltpetre, crude.
Sulphate of potash.
Sulphate of soda, known as saltcake, crude or refined, or nitre cake, crude or refined, and Glauber's salt.
Sulphur, refined, in rolls.
Wood-tar.
Coal-tar, crude.
Aniline oil and its homologues.
Coal-tar, products of, such as naphtha, benzine, benzole, dead oil, and pitch.
All preparations of coal-tar not colours or dyes, and not acids of colours and dyes.
Logwood and other dyewoods, extracts and decoctions of.
Spirits of turpentine.
Bone black, ivory drop black, and bone char.
Ochre and ochery earths, umber and umber earths, sienna and sienna earths, when dry.
All preparations known as essential oils, expressed oils, distilled oils, rendered oils, alkalies, alkaloids, and all combinations of any of the foregoing and chemical compounds and salts by whatever name known, and not specially enumerated or provided for.
All barks, beans, berries, balsams, buds, bulbs, bulbous roots, and excrescences, such as nut-galls, fruits, flowers, dried fibres, grains, gums, and gum resins, herbs, leaves, lichens, mosses, nuts, roots, and stems, vegetables, seeds, and seeds of morbid growth, weeds, woods used expressly for dyeing, and dried insects, any of which are not edible and specially enumerated or provided for.
All non-dutiable crude minerals, but which have been advanced in value or condition by refining or grinding, or by other process of manufacture, not specially enumerated or provided for.
All earths or clays, unwrought or unmanufactured.
China clay or kaolin.
Opium, crude, containing 9 per cent. and over of morphia, for medicinal purposes.
Antimony, as regulus or metal.
Quicksilver.
Chromate or iron or chromic ore.
Mineral substances in a crude state and metals unwrought, not specially enumerated or provided for.
Chicory root, ground or unground, burnt or prepared.
Acorns and dandelion root, raw or prepared; and all other articles used, or intended to be used, as coffee or substitutes therefor, not specially enumerated or provided for.
Cocoa, prepared or manufactured.
Bristles.
Finishing powder.
Grease.
Hemp and rapeseed, and other oil seeds of like character.
Lime.
Linseed or flaxseed.
Plaster of paris, when ground or calcined.
Tallow.

Sec. 2.—That on and after the first day of July, eighteen hundred and eighty-eight, in lieu of the duties heretofore imposed on the articles hereinafter mentioned, there shall be levied, collected, and paid the following rates of duty on said articles severally:—

Glycerine, refined, three cents per pound.
Acid, acetic, acetous, or pyroligneous acid, exceeding the specific gravity of 1·47, five cents per pound.
Castor beans or seeds, twenty-five cents per bushel of fifty pounds.
Castor oil, forty cents per gallon.
Flaxseed or linseed oil, ten cents per gallon.
Liquorice, paste or rolls, four cents per pound.
Baryta, sulphate of, or barytes, manufactured, one-eighth of one cent per pound.
Cement Roman, Portland, and all others, ten per centum ad valorem.
Whiting and Paris white, twenty per cent. ad valorem.
Chromate of potash, two and one-half cents per pound.
Bichromate of potash, two and one-half cents per pound.
Acetate of lead, brown, two cents per pound.
Acetate of lead, white, three cents per pound.
White lead, when dry or in pulp, or when ground or mixed in oil, two cents per pound.
Orange, mineral, and red lead, one and one-half cents per pound.
Litharge, one and one-half cents per pound.
Nitrate of lead, two cents per pound.
Magnesia, medicinal, carbonate of, three cents per pound.
Magnesia, calcined, seven cents per pound.
Magnesia, sulphate of, or Epsom salts, one-fourth of one cent. per pound.
Prussiate of potash, red, seven cents per pound.
Prussiate of potash, yellow, three cents per pound.
Nitrate of potash, refined, or refined saltpetre, one cent. per pound.
Sal soda, or soda crystals, one-eighth of one cent. per pound.
Bicarbonate of or super-carbonate of soda, and salaratus, calcined or pearl-ash, three-fourths of one cent. per pound.
Hydrate or caustic soda, one half of one cent per pound.
Soda silicate or other alkaline silicate, one-fourth of one cent. per pound.
Sulphur, sublimed or flowers of, twelve dollars per ton.
Ultramarine, three cents per pound.
Colours and paints, including lakes, whether dry or mixed or ground with water or oil, not specially enumerated or provided for, twenty per centum ad valorem.
Zinc, oxide of, when dry, one cent. per pound; when ground in oil, one and one-half cents per pound.
All medicinal preparations known as cerates, conserves, decoctions, emulsions, extracts, solid or fluid, infusions, juices, liniments, lozenges, mixtures, mucilages, ointments, oleo-resins, pills, plasters, powders, resins, suppositories, sirups, vinegars, and waters, of any of which alcohol is not a component part, which are not specially enumerated or provided for, twenty per centum ad valorem.
All ground or powdered spices not specially enumerated or provided for, three cents per pound.
Proprietary preparations to wit: All cosmetics, pills, powders, troches or lozenges, sirups, cordials, bitters, anodynes, tonics, plasters, liniments, salves, ointments, pastes, drops, waters, essences, spirits, oils, or preparations or compositions recommended to the public as proprietary articles or prepared according to some private formula as remedies or specifics for any disease or diseases or affections affecting the human or animal body, including all toilet preparations whatever used as applications to the hair, mouth, teeth, or skin, not specially enumerated or provided for, thirty per centum ad valorem.

Morphia or morphine, and all salts thereof, fifty cents per ounce.

Acid, tannic or tannin, fifty cents per pound.

Green and coloured glass bottles, vials, demi-johns and carboys (covered or uncovered), pickle or preserve jars, and other plain, moulded, or pressed green and coloured bottle glass, not cut, engraved, or painted, and not specially enumerated or provided for, three-fourths of one cent. per pound; if filled, and not otherwise provided for, and the contents are subject to an ad valorem duty, or to a rate of duty based on their value, the value of such bottles, vials, or other vessels shall be added to the value of the contents for the ascertainment of the dutiable value of the latter; but if filled, and not otherwise provided for, and the contents are not subject to an ad valorem duty or to a rate of duty based on their value, they shall pay a duty of three-fourths of one cent. per pound in addition to the duty, if any, on their contents.

Flint and lime glass bottles and vials, and other plain moulded, or pressed flint or lime glassware, not specially enumerated or provided for, thirty per centum ad valorem; if filled, and not otherwise provided for, and the contents are subject to an ad valorem duty, or to a rate of duty based on their value, the value of such flint or lime glass bottles or vials, or other vessels of like material above provided for, shall be added to the value of the contents for the ascertainment of the dutiable value of the latter; but if filled and not otherwise provided for, and the contents are not subject to an ad valorem duty, or to a rate of duty based on their value they shall pay a duty of thirty per centum ad valorem in addition to the duty, if any, on their contents.

Cylinder and crown glass, polished, above twenty-four by thirty inches square and not exceeding twenty-four by sixty inches square, fifteen cents per square foot; all above that, twenty-five cents per square foot.

Unpolished cylinder, crown, and common window glass, not exceeding ten by fifteen inches square, one cent. per pound; above that and not exceeding sixteen by twenty-four inches square, one and one-fourth cents per pound; above that, and not exceeding twenty-four by thirty inches square, one and one-half cents per pound; all above that, one and three-fourths cents per pound.

Cast polished plate-glass, unsilvered, above twenty-four by thirty inches square and not exceeding twenty-four by sixty inches square, twenty cents per square foot; all above that, forty cents per square foot.

Cast polished plate-glass, silvered, or looking-glass plates, above twenty-four by thirty inches square and not exceeding twenty-four by sixty inches square, twenty-five cents per square foot; all above that, forty-five cents per square foot.

Porcelain and Bohemian glass, chemical glassware, painted glassware, stained glass, and all other manufactures of glass, or of which glass shall be the component material of chief value, not specially enumerated or provided for, forty per centum ad valorem.

Lead ore and lead dross, three-fourths of one cent. per pound.

Lead, in pigs and bars, molten and old refuse lead run into blocks, and bars and old scrap lead fit only to be re-manufactured, one and one quarter cents per pound. Lead in sheets, pipes, or shot, two and one-quarter cents per pound.

Potato or corn starch, rice starch, and other starch, one cent. per pound.

Mustard, ground or preserved, in bottles or otherwise, six cents per pound.

Sec. 4. That on and after the first day of July, eighteen hundred and eighty-eight, in lieu of the duties heretofore imposed on the articles hereinafter mentioned, there shall be levied, collected, and paid the following rates of duty on said articles severally:

Blacking of all kinds, twenty per centum ad valorem.

Brooms of all kinds, twenty per centum ad valorem.

Brushes of all kinds, twenty per centum ad valorem.

Friction and lucifer matches of all descriptions, twenty-five per centum ad valorem.

Indiarubber fabrics, and articles composed wholly or in part of indiarubber, and indiarubber boots and shoes, fifteen per centum ad valorem.

Inks of all kinds, and ink powders, twenty per centum ad valorem.—*Oil, Paint, and Drug Reporter.*

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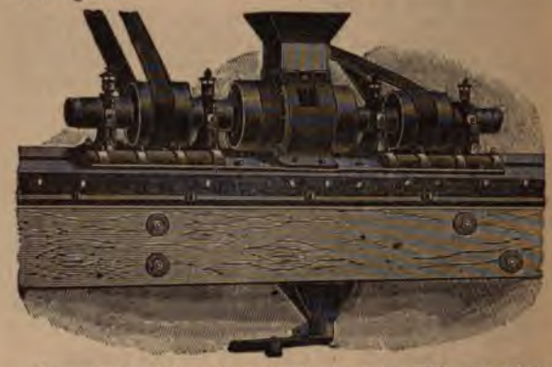
The Manure Trade.—The sale of guano of the Anglo-Continental Guano-Work, at Hamburg (formerly Ohlendorff and Co.), for the year 1887 has been 123,123 tons against *101,204 tons* in 1886.—*L'Engrais.*

## THE STURTEVANT MILL.

THERE is at present in operation at the chemical manure works of Messrs. Langdale and Co. Limited, Newcastle-on-Tyne, a crushing and grinding mill which will be novel to most of our readers. The invention is an American one, and it is named the Sturtevant Mill, an illustration of which is here given.



Messrs. Langdale and Co.'s Sturtevant mill is one of the largest size made, and the cups (or "heads" as they are termed) are 20 inches in diameter, and the record of work done shows its ordinary and legitimate capacity in dealing with a very hard stone, yet it only weighs 9 tons altogether, and an ordinary bed suffices for it. The space it occupies is but 4 feet by 14 feet, and it is 5½ feet in height. To every system belongs disadvantages of some sort, and the drawback to the system on which the Sturtevant mill is constructed is that it is not available for the grinding of tough or fibrous substances. Its business is with the milling of ore, mineral phosphate, stone of all kinds, and cement, and this it performs, in our opinion, with unrivalled economy and efficiency. Its success was assured in America by four a years' trial before it was introduced into this country, and it is easy to foresee that it will rapidly come into extended use in England, Germany, Spain, and France. In its construction a new principle in mechanics is developed, and it differs entirely from any other crusher or pulveriser now before the public. Like other mechanical successes which can be mentioned, the appliance is wonderfully simple in plan, and there is not the smallest difficulty in comprehending the action of its different parts. Briefly speaking, it is a mill without teeth, beaters, or hammers of any kind. Strange as it may seem, the mill does not really grind the materials fed into it, but simply furnishes the power by which they grind themselves. The essential parts of the mill are but four in number—namely, a pulverising chamber, or case, a cast-iron screen, and two hollow heads or cups. The stone or ore to be crushed is fed into the hopper which surmounts the case, and as it drops in the screen catches it and prevents it from falling below the cups. The latter are affixed to revolving shafting, and they each project about half an inch into the case. The cups are rotated by power in a direction contrary to each other, and a strong centrifugal force is thus created. The stone entering the case falls into the revolving hollow cups, which hurl the pieces out with tremendous force against each other, and in the collision they are broken to powder. This is the entire process: the stones are not struck a second time, but are immediately let out of the screen and pass into a hopper below. The rapidity with which the process is carried on is remarkable, but not more so than the absence of noise, vibration, and heating which characterises it. One or two details of the procedure bearing upon the slight wear which the apparatus endures may here be given. As soon as the mill is fairly in motion and the pulverisation of the stone commenced with, the material operated upon lodges inside each cup and forms a stone-like conical lining, which completely protects it from wear except at the edge. Something similar takes place with the case, so that, in fact, the entire interior of the machine, except only the extreme edge of the two cups, is preserved from damage, which would not be great even if the hard coat of powdered stone did not intervene. For it should be understood that the materials are not in any case dashed against the sides of the case, but always against each other in the centre of the chamber. With regard to the single wearing point of the mill, the extreme edge of the cup, it may be mentioned that the par

can be easily taken off and replaced at a trifling cost. Each cup is composed of two pieces, namely, a short cylinder, or bushing, and a solid base. It is the edge of the bushing which is exposed to the action of the substances placed in the mill, and the piece can be detached when worn, and be substituted by one made in any engineering works.

Messrs. Langdale say:—"The mill has not only pleased us very much, but it has surprised us." They have had it running now for about four months. Last week it was set to work on a shipment of 3,000 tons of mineral phosphate from South Carolina, and the mill has been at work upon it for eight days. This is its record of rock ground so fine that the whole of it passed through a quarter-inch screen:—First day, ten hours, 140 tons; second day, nineteen hours, 303 tons; third day, eighteen hours, 302 tons; fourth day, fifteen hours, 237 tons; fifth day, twenty hours, 232 tons; sixth day, eighteen hours, 227 tons; seventh day, twenty hours, 290 tons; eighth day, eighteen hours, 267 tons. From the ground rock about 14 per cent. of fine powder which will pass through a sixty-mesh sieve was obtained—that is, a sieve with 3,600 holes to the square inch. In this case, the moisture is about three per cent., whereas the ordinary run of cargoes contain only from one-half per cent. to one per cent. of moisture. Had this cargo been of the average dryness there would have been obtained about 25 per cent. of fine powder capable of being passed through a sixty-mesh sieve. The mill was started for the grinding of rock phosphate at Christmas time. One very good thing about this mill is its freedom from accidents through hard substances being fed into it. Bits of steel thrown into the hopper make no difference, and even hammer heads may be put in without causing any damage. They will not be ground up, but they will not break anything, and they can be taken out of the case by merely stopping the mill for a minute and lifting up one of the heads.

The Sturtevant mill was brought out in America about four years ago, and since that time it has been in extensive use as an ore-crusher and grinding machine throughout the States, and more especially in the mining districts of the west. But it was only introduced into England last autumn, and so far in this country, its capabilities have mainly been tested by chemical manure and cement manufacturers. Messrs. Langdale and Co. possess the first of the Sturtevants fitted up in this country, and the management of the works have adapted it to their uses with signal success. The phosphate rock is filled into wagons, of about a ton and a half capacity, at the river front of the works, and run along a light railway until reaching an opening in the floor, where it is discharged into a shoot, down which it slides by gravitation in a steady stream to the mill in the room below. The bottom of the shoot discharges a regular supply of the rock into the hopper that surmounts the case or pulverising chamber of the apparatus, which is about two feet in its longest diameter, and into which the cups on either side operate. The orifice by which each cup enters the case is not air-tight by any means, a minute space being left all round to prevent friction, and if the eye be directed steadily along the rapidly revolving shafting, a glimpse can now and then be obtained of flashing sparks, in the interior of the case, caused by the violent collision of the rock particles as they are thrown against each other from either side. Yet there is no dust flying about the mill; the case is not heated in the slightest degree, and the hand placed upon it detects exceedingly slight vibration, considering the tremendous power that is being exerted within. Of course, a very large quantity of dust is disengaged inside the case, and it is got rid of by means of a suction fan which draws air strongly into the mill, and carries the dust away by covered channels to an enclosed chamber, where it becomes engaged in a series of sacking cones, and every particle of it is recovered. The ground rock, on leaving the mill, is subjected to the action of a separator, which has been invented by Mr. David Crawford and Mr. Andrew Crawford, of Messrs. Langdale and Co.'s works, and Mr. Ravensley, of the Sturtevant Mill Company. By means of this apparatus, the finest of the phosphate meal is separated from the rougher product, and the latter is conducted to a mill fitted with the ordinary stones, where it is ground to the requisite fineness.

A Colossal Transaction.—At a meeting of the Cape Copper Company an agreement was sanctioned with the French Metal Company for the sale of 5,750 tons of best selected copper per year for three years, with the option of an extension of the arrangement for a further three years. The price to be paid is £70 per ton.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

R. H. D.—Wagner's Jahresberichte can be seen at the rooms of the Manchester Chemical Club.

H. C.—We do not know. Write to the secretary.

Sodium.—It is one of those things that can only be settled by experiment; it is, however, very improbable.

B. J. C.—Consult an analytical chemist of repute.

Analyst.—Yes. The laboratory is not now in existence. We shall be pleased to do the work for you.

Gas Manager.—Crude naphtha is sold on the basis of 30 %, distilling at 120° C. The test is not a difficult one, but requires care. We will give a description of it some day.

Industry.—We hear there is a great dearth of papers in Manchester and Glasgow, and there will be no meetings this month.

Manganese.—Yes, the process is still being worked in one or two places.

T. H. C.—In our next.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—In reply to the inquiries of "A Country Fellow" (of the Institute of Chemistry) page 263, I beg to say that according to the rules of the Society of Public Analysts all analysts in actual practice are eligible for membership; and, as a fact, a large number of the members, if not an absolute majority of the society) are chemists who hold no appointment under the Sale of Food and Drugs Act. I may add that we should welcome among us all those who are interested in the objects for which the Society of Public Analysts was formed, which by its constitution are defined to be—

1. To promote and maintain the efficiency of the laws relating to adulteration.
2. To promote and, as far as possible, to secure the appointment of competent public analysts.
3. To improve the processes for the detection and quantitative estimation of adulterations, and to secure uniformity in the statement of the results by holding periodical meetings for the reading and discussion of original papers on chemical and microscopical analysis, especially with reference to the detection of adulteration.

I may further add that the subscription to the society is £1. 1s. annually, which includes the free delivery of the monthly journal, *The Analyst*, and that the secretary of the society is Mr. Bernard Dyer, 17, Great Tower-street, London, E.C.

Your correspondent will see from the above that the objects of the Society of Public Analysts are distinct from those of the Institute of Chemistry, and I believe there is plenty of room for the two societies to exist side by side without in any way interfering with the functions proper to either. I have been a member of the Institute ever since its formation, and have sat on the council for the past five years. I have been completely at issue with the majority of the council, and cordially sympathise with Mr. William Thomson and Mr. Otto Hehner in their efforts to introduce fresh blood, and regret that through tactical errors they did not entirely fulfil their object. Nevertheless, a great deal has been done. It is an open secret that the Nominations and Examinations Committee are taking into consideration the desirability of extending the facilities for entering the Institute to those who may have studied elsewhere than at one of the very select number of institutions which have hitherto had the patronage of the council. Further, in accordance with a resolution proposed by myself, the members of the council generally will have communicated to them beforehand the reports of the various sub-committees, so that the business at the council meetings may not in future be limited to recording recommendations which members have had no time to consider. Further, such portions of the proceedings of the council as can be made public without injury to the interests of the Institute will be communicated to the Fellows periodically. I believe that much of the dissatisfaction which has existed with reference to the management of the Institute has been due to the omission of the council to inform the outside members of what has

been done in their interests; in fact, even the members of the council have been ignorant of the proceedings if not personally present at the meetings.

In conclusion, I agree with your correspondent that "reform is certainly required," and I hope that the ventilation of the subject in your columns will result in attainment of the desideratum.—I am, sir, yours truly,

ALFRED H. ALLEN,
President of the Society of Public Analysts.
Sheffield, April 30th.

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*To the Editor of the Chemical Trade Journal.*

Sir,—Judging from the action of the President and council at the last annual meeting of the Institute, I appeal to the Fellows resident, both in London and the country, to know whether they as a body are satisfied with the result of that annual meeting. The president seemed to take up the position that as the members generally had placed him in the high and responsible position which he then occupied and had occupied for some years, he was in a position to work his own sweet will without taking any notice of complaints and grumblings from the outside. This is all very well and applies with equal force no doubt to each individual member of the council, but the time will come most assuredly when outside members will either make their voices heard or will cease to contribute to the funds of the Institute. I think we have been told clearly enough that the Institute cannot do anything for the chemist, it may possibly do something for the public, then I say let the public support it, and compel the council to draw their funds from those who have confidence in their administration.

Something must be done, and I would suggest that we commence to work actively *now* and not wait until a few weeks before next general election. I would further suggest that the Fellows who issued the circulars before the last annual meeting should endeavour to form several committees, and one central committee uniting the several, and let anything that is done issue from that central committee. It would inspire much more confidence if such was done, than by the issue of a circular by a Fellow in his private capacity. I shall be pleased to hear what Mr. W. Thomson, Mr. Allen, and others, think of my suggestion. For my part, I am thoroughly dissatisfied with the Institute as it now stands, and would help in any way to reform it.—I am, etc.,

AN ANALYST OF MANY YEARS STANDING.

# Our Book Shelf.

WATT'S DICTIONARY OF CHEMISTRY. Edited by H. Forster Morley, M.A., D.Sc., and M. M. Pattison Muir, M.A. Vol. I. London: Longmans, Green & Co.

Welcome news to the members of the chemical profession will be the issue of a new edition of Watt's Dictionary of Chemistry. For many years now a re-issue of this treatise has been inquired for, as the earlier volumes of the original work have become quite antiquated, and the issue of supplementary volumes, though one way of keeping the chemist posted up with the later information, is not convenient for the possessor, as those who now have the later works on their shelves will only be too ready to testify. In short, this first volume may be welcomed in parodical words—

"It comes as a boon and a blessing to men,"
By H. Forster Morley and M. M. P. M.

We are told in the preface that while the original edition was called a "Dictionary of Chemistry and the Allied Branches of other Sciences," the new edition deals with chemistry only, and that whereas considerable space was devoted in the original work to processes of chemical technology, the new edition gives no special information with regard to these matters. We further find that technical chemistry will be treated of in a companion volume to be published under the editorship of Prof. Thorpe. Details regarding analytical processes are also omitted.

It will thus be seen that the new edition differs very considerably from the old work, and in our opinion the change will be for the better—technical processes can only be satisfactorily treated of in a work entirely devoted to industrial chemistry, and by specialists under the editorship and guidance of a technical chemist, and similar arguments may be urged in favour of treatises on analytical chemistry. We are pleased to find the work has been evenly divided. Chemistry has grown so immensely that it is no longer possible for one man to cover the whole ground, and if a chemist claims to be able to ramify throughout the whole field satisfactorily, we say he is a very clever man. In this case one of the editors is responsible for the inorganic and general chemistry, and the other for the organic, this latter being dealt with by Mr. Pattison Muir.

No chemist can take up the subject volume of this notice without being satisfied with it, though it is open to doubt whether it will be found possible to complete the work in four volumes. It is not possible to satisfactorily review such a work as this in the small compass we have to spare for such a purpose; therefore suffice it to say that in perusing the articles the whole of them seem to be written in a most complete manner, bringing in information of the most recent date and in a very systematic way. Specially we may mention the articles on analysis, atomic and molecular weights, azo-compounds, bacteria, benzene, cellulose, and chemical change, any one of which, carefully perused, will serve to show the character of the matter now put forward as the dictionary of chemistry for use by chemists of the present generation. In this notice we would like to throw out a hint to the publishers. Could not each volume be divided into twelve parts, so as to bring it within the reach of those chemists who cannot invest in the complete volume.

# Legal.

## PATENT OPPOSITION CASE.

SIMON *v.* VAN GELDER.

AN opposition case, of great interest to the milling trade, was decided last month. In 1878 Mr. Van Gelder, of Liverpool, took out a patent for a grain and flour sieving apparatus, which invention has come into very general use. In this he showed a system of balanced sieves, which is admitted to be entirely new. In the patent he claimed the principle described for all kinds of sieves, balanced or unbalanced. In 1887, Mr. Simon, of Manchester, having made and sold certain machines, a clear infringement of this patent, Mr. Van Gelder threatened proceedings. Mr. Simon proved, however, that fifty years ago, and to a limited degree since, single unbalanced sieves had been used on substantially this principle for sieving oatmeal, and that, therefore, until the patent was amended, it was void.

Mr. Van Gelder applied for an amendment, which Mr. Simon opposed, and also asked that if the amendment be granted conditions should be imposed preventing Mr. Van Gelder from proceeding against him for past infringements. The comptroller, after hearing Mr. John Imray on the part of Mr. Simon, and Mr. W. P. Thompson for Mr. Van Gelder, granted the disclaimer, subject to a verbal alteration, but without imposing any conditions; Mr. Van Gelder accepted the alteration; Mr. Simon appealed. The case was heard before the Attorney-General, Mr. Moulton, Q.C., and Mr. John Imray, patent agent, appearing on behalf of Mr. Simon, and Mr. W. P. Thompson, patent agent, on the part of Mr. Van Gelder. Exception was taken by Mr. Moulton, Q.C., to the decision of the comptroller, on the ground that the alteration ordered by him, unless made the subject of a fresh application and fully advertised, was illegal. Also that the disclaimer extended the scope of the invention claimed. Mr. Thompson contended that it was only the nature of the amendment that the law required to be advertised, that the comptroller's variation was of precisely the same nature as that originally advertised, and was little more than verbal, and that it really described the invention better than the original claim, and defined and contracted rather than extended the scope of the invention claimed. The Attorney-General gave judgment in favour of Mr. Van Gelder on both points, and allowed the disclaimer, without re-advertising or imposing any conditions, and with costs. From this decision there is no appeal.

## THE GLYCERINE PATENT.

THE SUPREME COURT REVERSES ITS FORMER DECISION.

IN 1854 Mr. Richard A. Tilghman, of Philadelphia, obtained a United States patent for the manufacture of glycerine and stearic acid from ordinary fat, by the use of

highly-heated water alone, under pressure in a close boiler. The invention revolutionised the manufacture of candles in that country, and led to the production of glycerine at such a price as brought it for the first time in general use. He visited England and sold his patent to the Prices, of London, the great glycerine manufacturers. While engaged in the introduction of his invention into England, several large manufacturers in this country appropriated Tilghman's invention. Among them were R. G. Mitchell, of New York, and Proctor and Gamble, of Cincinnati. In 1858 Tilghman, through George Harding as counsel, sued Mitchell in the Circuit Court of New York. After many years of litigation that court gave Tilghman a decree sustaining his patent and ordering Mitchell to pay the sum of $250,000 damages.

From this decree Mitchell appealed to the Supreme Court of the United States. That court decided that Mr. Tilghman's patent was limited to a mere apparatus, and did not cover or control the broad process or principle of decomposing fat by highly heated water, and that as Mitchell had not used Tilghman's apparatus he could recover nothing, and reversed the decree of the lower court. Not daunted by this defeat, Tilghman prosecuted a new suit against Proctor and Gamble, of Cincinnati, who were using the same apparatus that Mitchell had used.

The Circuit Court in Ohio, following the decision of the Supreme Court, decreed that Tilghman could recover nothing, and dismissed his complaint. An appeal was again taken to the Supreme Court of the United States, and on this occasion Mr. Harding, representing Mr. Tilghman, presented the case to that court, and it unanimously reversed its former decision and decided that Mr. Tilghman was entitled to the patent for the principle or process, and that Proctor and Gamble must pay him for using it. The case was returned to Judge Baxter, in Ohio, to ascertain how much Tilghman should be paid. The judge decided that the rate which other licensees had paid Mr. Tilghman was the measure of his damage, and awarded to Tilghman $79,566.

From this award Tilghman appealed, claiming that the license fee which honest users paid should not be the measure of the amount which an infringer should pay, and that he was entitled to receive all the money savings which Proctor and Gamble had made by their wrongful use of the patent. The Supreme Court, in the decision just rendered, determined that the usual license fee of Tilghman was not the limit of the amount which he could recover, and awarded $266,153 86c. as damages, with interest for three years and five months, amounting to $320,715. Mr. Tilghman was represented at the final argument by Messrs. Harding and Chambers, and the defendants by Parkinson and Ramsay, of Cincinnati.

# Trade Notes.

THE EFFECT OF FOREIGN GOODS—The 12,000,000 cwt. flour or wheat meal imported into this country in ten months gives us 5,760,000 bags, 20 stones each, in twelve months, which, if manufactured in this country, would require 120 corn mills turning out 1,000 bags per week each, and would cost in construction £2,400,000, taking a capital of about £1,200,000 to work them, employing 3,600 men, and, if worked by steam, £50,000 per year for coal.

"INDUSTRIES" LIMITED.—This company was registered on the 16th ult., with a capital of £20,000, in £10 shares, to acquire and carry on the newspaper called *Industries*. The subscribers are:—*J. Moseley, Levenshulme, Lancashire, manufacturer, 100 shares; G. Cawley, Didsbury, Lancashire, engineer, etc., 20 shares; *H. Fairclough, Warrington, Lancashire, corn miller, 100 shares; R. Allen, Victoria-park, Manchester, newspaper proprietor, 25 shares; J. H. Buxton, Poynton, Cheshire, newspaper proprietor, 25 shares; W. E. Heys, Chorlton-on-Medlock, consulting engineer, 25 shares; J. H. White, Chorlton-cum-Hardy, indiarubber agent, 25 shares. The subscribers denoted by an asterisk, and Messrs. William Grimshaw, David Moseley, and James Fairclough are the first directors.

PHYLLOXERA IN SPAIN.—It is not in France alone that the phylloxera is blackening the face of the land and bringing ruin upon the peasantry. We learn from Mr. Woolridge's report to Lord Salisbury that the phylloxera is threatening to kill entirely wine-growing in the fruitful Spanish province of Catalonia. To the south as to the north of the Pyrenees, the attempts of science have thus far failed to provide a remedy for this dire pest.

DISCOVERY OF PRECIOUS METAL.—A new mine of platinum has been discovered—platinum, so much more precious than gold. But it is beyond the diggers' reach. Professors Hutchins and Holden, of Harvard University, U.S., have, by the application of new instruments and new methods of observation, determined more accurately than had ever been done before, the nature of the constituents of the sun's atmosphere. They have discovered platinum in the sun, all other observers having sought for it in vain.

CHROMATIC PHOTOGRAPHY.—Mr. J. E. Mayall, of New Bond-street, writes a London correspondent, has recently made a great advance in the science of photography. About a year ago he discovered that in every photographic negative taken the natural colours of the object are latent and capable of being developed by certain acids, having a chemical affinity to the colours. Working on this theory he has succeeded in practically demonstrating the possibility of chromatic photography. To-day I went, in company with others, to inspect some of the products of his camera. They were all beautiful, some of them remarkably so. The flesh has all the vivid colouring of life, every tint and lustre of the face and eyes being apparent, while the tones and shades in the dress are soft and natural. The colours being developed and not applied, are permanent—the action of sun and light tending rather to strengthen than diminish them.

DARLINGTON GAS.—Darlington is to have the price of its gas reduced to 2s. per 1,000 cubic feet; and in making this known the chairman of the Gas Committee added that "there was every prospect that twelve months hence the price of gas would be reduced to 1s. 10d. per 1,000." It is quite evident that further reductions in the price of gas will soon have to be made by the towns which contend for the credit of selling gas cheapest. The reductions are wise, for other illuminants are likely to have increased use otherwise.

THE LOCKWOOD AND LEITH FAILURE: THE DEBTORS' OFFER REFUSED.—The second meeting of the creditors of Messrs. Lockwood and Leith, chemical manufacturers, of Boundary-road and Parr, St. Helens, was held on Tuesday afternoon, at the offices of the Official Receiver, Victoria-street, Liverpool, to confirm or otherwise the proposals made by the debtors to pay a composition of 5s. in the pound. There was a large attendance of creditors. Mr. Gittins, the Official Receiver, was voted to the chair. The Chairman, in opening the business, stated that he had received an offer from Mr. Hawkins, solicitor, on behalf of a client, of 6s. in the pound and costs, and he added that he could not recommend the acceptance of the offer made by the debtors in the face of the increased offer. Mr. Oppenheim said the counter offer had nothing whatever to do with the business of that meeting, as it could deal with no other offer than that of the debtors. The Chairman then put the proposal of the debtors to the vote of the meeting. It appears that proofs had been delivered to the amount of over £21,000, and it was necessary, to confirm the offer made by the debtors, that creditors holding three-quarters in value of the total amount proved against the estate should vote for the proposal. This made a sum of £16,400. After the resolution had been signed by apparently all those in favour of it, it was found that the sum represented reached £16,275. The Chairman declared that the resolution had not been carried, and one or two gentlemen who had not voted expressed their willingness to vote in favour of the debtors' proposal, their votes representing £800. The Chairman declined to accept their votes on the ground that it was then too late. A very hot discussion ensued, ending in the meeting being adjourned to the 3rd of May, to allow the court being moved to authorise the acceptance of the votes in question.

RUSSIAN COAL.—It is estimated that 2,903,225 tons of coal will be available for transport this year from the Donetz coal-basin in New Russia, lying between the Don and Dnieper. Last year 1,290,322 tons were transported. Prior to 1860 the Donetz coal-basin was not worked. The construction of the South Russian railways has led to the opening-out. Those who now buy coal from the Donetz basin need not, as a matter of course, to send for coal to Silesia, Westphalia, or England.

WHAT NEW MILK CONSISTS OF.—At Bolton last week, a milk dealer, named John Heaton, was charged with selling adulterated milk. The analysis of Dr. Sergeant, medical officer of health, showed that the liquid sold as new milk was half water, being thickened with starch and coloured with treacle for sale purposes. The defendant contended that the business belonged to his wife, and on this technical point the case was dismissed, the Town Clerk threatening to prosecute the defendant's wife.

Gunpowder Explosion.—Last week an explosion took place at Burnside, Broxburn, whereby six children were more or less severely scorched on the face and hands. It appears that James Campbell, mining contractor at Holmes's Oilworks, had sent his daughter Maggie to the magazine near the house to fill some gunpowder. One of the other children who accompanied her struck a match and ignited a broken cartridge, with the result that an explosion took place. The ages of the six children injured range from fourteen to four. Their names are Maggie, William, and James Campbell, Wm. Gardner, James Hood, and Lizzie Webster.

Bricklaying in Frosty Weather.—Mr. Michell, British Consul-General at Christiania, referring to a previous report of his (see the *Times*, January 7) on the practice of Norwegian builders to work in the coldest weather, says, in a communication published in the *Board of Trade Journal*:—As a striking confirmation of the durability of work done under such circumstances, I have the honour to report that five courses of a house-wall laid on the 10th of March in 14° Fah. had to be pulled down on the 12th and 13th owing to a mistake made by the contractor, and that the mortar, when attacked with crowbars, proved to be harder than the bricks, the fractures having in many cases run across the bricks instead of following the mortar joints."

The Alien Laws in the States.—Eighteen Italian marble-workers, imported under a contract to work for Bowker, Torrey, and Co., quarrymen, of Boston, have been forbidden to land from the steamer *Rugia*, which has arrived in New York from Hamburg. The importing firm, and also the owners of the steamer, are liable to a fine of $1,000 for each man imported, under the law forbidding the importation of foreign contract labour into the United States.

Poisoned by Mistake.—An inquest was held last week at St. Bartholomew's Hospital, London, by Mr. Langham, on the body of Robert Samuel Nixon, aged 32, an ironplate worker, late of Austral-street, West Square, Southwark. The wife said on the 28th of November her husband took some spirits of salt in mistake for beef tea. Witness was upstairs at the time, and deceased called to her, "Liz, I have poisoned myself. I have taken salts for beef tea." Witness fetched a doctor who ordered his removal to the hospital. He was for three weeks an inmate of St. Thomas's Hospital, when he discharged himself. He subsequently told witness that he had taken the poison in mistake for sweet oil, as he felt queer in the chest. Deceased again went into St. Thomas's Hospital, where he remained over three months, and then became an inmate of St. Bartholomew's, where he died on Saturday.—Dr. Andrews, house physician, deposed that death was owing to an ulcerated stomach due to the action of the poison.—Verdict, accidental death.

Heavy Fine under the Margarine Act.—Recently at the Shrewsbury Police Court, John Goodwin, a provision dealer, of Castle-street, was charged with selling as a tub of butter, one of margarine, which was not labelled as such. The matron of Salop Infirmary deposed to giving an order to the defendant, on the usual printed form of the institution, for a tub of butter. What she believed to be one was sent to the institution, and she tasted it, and some of it was used under the idea that it was pure butter.—Mr. T. P. Blunt, analyst, deposed to receiving a sample of the material, which he analysed, and found it to contain but 20 per cent. of butter, the rest being added fats.—A fine of £20, including costs, was inflicted, the bench being of opinion that there were no mitigating circumstances in the case.

## THE PRESENT STATE OF THE LAW CONCERNING THE POLLUTION OF AIR AND WATER.

BY ALFRED E. FLETCHER, F.C.S., F.I.C.,
H.M. Chief Inspector under the Alkali, etc., Works Regulation Act.

TWO courses might be indicated for overcoming the difficulty here pointed out. First, the list might be kept complete if powers were conferred on the Local Government Board to add from time to time the names of those works or processes which were found to emit such noxious gases as called for the kind of chemical inspection provided under the Alkali Act. Year by year the list would grow until every trade known to be noxious was included in it. Or a second method would be to cast off the limitation of an Alkali Act in favour of an Act for the repressing of noxious vapours generally. A list of these can be made out much more easily than can a list of the processes which produce them, and this list could be added to from time to time as the necessity occurred.

The first course involves the making and keeping complete a list of those processes of manufacture which are liable to produce noxious gases.

The second involves the enumeration of noxious gases found to arise from processes of manufacture or otherwise. A practical instance of the difference here pointed out can be shown by the following:—

The manufacture of sulphate of soda with evolution of hydrochloric acid gas is placed under inspection by the Alkali Act, and the escape of this gas into the air renders the manufacturer liable to heavy penalties; he therefore causes it to pass into a wash-tower or other apparatus, where, exposed to contact with water, it is dissolved, forming liquid hydrochloric acid. If now this acid is sold to a neighbouring manufacturer, who, for the purposes of his trade, exposes it to heat, and thus drives off much or even all of it into the air, he does not come within reach of the inspector under the Alkali Act.

A very common and similar case is that of nitric acid. The maker of this must conform to the provisions of the Alkali Act, but the purchaser of this same acid may use it in the solution of metals, or in any of the thousand ways in which this acid is employed, and in so doing drive off much of it, or of the lower oxides of nitrogen, into the air without coming under the restrictions of the Alkali Act. If, however, the act of discharging into the atmosphere any of the gases named were forbidden, that would include the escape of the acid during its manufacture and also during its subsequent use.

It is clear that a standard or limit of condensation for all noxious gases arising from various sources and produced under varying conditions cannot be devised, and though the few standards that are embodied in the Alkali Act have done good service, yet in future it may be better to rest on the more general enactment already referred to, which was first introduced in the Amended Alkali Act of 1874, and repeated in that of 1881, that "the owner of any works shall use the best practicable means for preventing the discharge into the atmosphere of all noxious gases, and of all offensive gases evolved in such works."

Although this clause embodies no fixed standard by which to determine the amount of noxious vapour which may be allowed to pass into the air without its being considered a violation of the Act, yet, after a short time, standards would adjust themselves. After repeatedly ascertaining in various works throughout the country the extent to which a noxious gas produced during the working of a certain process can be arrested, and how much still escapes when the best appliances are employed, a standard grows up and is understood by both manufacturer and inspector to be the amount beyond which no escape can be permitted. In the public report presented annually to the Local Government Board by the chief inspector, the average results of inspection, and the standards adopted are published, and thus become definitely known. They are better than any standard fixed by Act of Parliament, because they are ever advancing according as our knowledge increases, and improved methods of manufacture are adopted.

It is now twenty-five years since the first Alkali Act was passed. At first only alkali works, those engaged in the soda manufacture, were included; of these there were 85 in the year 1864; these subsequently increased to the number of 150. The country, including Scotland and Ireland, was divided into four districts; each was placed in charge of an inspector, and the whole was superintended by a chief inspector, the late Dr. R. Angus Smith. At first the manufacturers were in doubt as to how their new visitors were to be received. Did they come as friends or foes? I remember my first introduction when, in 1864, I entered on my duties as Inspector of the North-Western district. It was at a large alkali works in Lancashire. I was brought into the chemical laboratory, and stood surrounded by a small group of chemists and managers. The principal manager then introduced me as "the gentleman who had come down from London to teach them their business." After the lapse of twenty-four years one can afford to smile at what was not over-pleasant at the time, and those who are familiar with Lancashire men will appreciate the cutting sarcasm which saturated that little speech. I must say, however—and in this I know I shall be borne out by my colleagues—that the large manufacturers with whom we had to deal were ever

open and candid with us. They knew we had our duty to perform, and they placed no hindrance in our way; on the other hand, they soon found that our continual testing the gases passing away from their processes was a means of helping them to improve their system of working, and to introduce many economies of the possibility of which they had till then been ignorant. Very great changes were gradually introduced; the means of condensing and arresting the escape of acid gases were improved until the standard fixed by the Act for the condensation of hydrochloric acid was soon left behind, and was only approached in cases of accident or exceptional carelessness. So much did manufacturers vie with one another to keep well within the limits laid down by the Act that very few prosecutions took place; they were only found necessary in quite exceptional cases. Indeed, the landed proprietors complained that the Act was not efficiently administered, or there would have been more prosecutions. Those, however, on whom the responsibility rested, felt that the main object of the Act was not to multiply prosecutions but to keep down the amount of acid and destructive gases liable to escape. That this was only to be done by instituting a system of reform in the methods of working and the construction of apparatus, by carrying out, indeed, a system of education which could not be the work of a day.

Remembering now the continued effort that has been during so many years put forth, it is satisfactory to know that if we did not go "to teach them their business," we have at least been able to help them to increase their knowledge of it, thus benefiting them while we protected our clients the farmers.

As showing the feeling that has grown up between the manufacturers and the inspectors, I will quote the words of Mr. A. M. Chance, the well-known and influential chemical manufacturer, at Oldbury, Staffordshire. They occurred in a paper read by him in 1883 before the Birmingham Philosophical Society. He says:—

"In my opinion Government inspection has not only led to material improvement in the general management of chemical works, but it has also been in reality a distinct benefit to, rather than a tax upon, the owners of such works; and so long as gentlemen of high scientific attainments continue to be appointed, who are thus capable of assisting manufacturers in their endeavours to improve their processes, Government inspectors ought to regarded by the owners of inspected works in the light of friends."

Up to the end of 1881, alkali works only were under inspection, then the area was increased, and various other chemical trades were brought within the scope of the new Act. The number of works now under inspection is 1,060. The country is divided into seven districts, in which are nine inspectors and sub-inspectors. There is also a chief inspector. During the last few years the duty of the inspectors has been very heavy. The smaller chemical works scattered through the country are not always carried on with the same skill and scientific management as is the case with the larger alkali works, and much effort has been necessary to bring them into conformity with the provisions of the Act. Much of this difficulty has now been overcome, and it is hoped that the work will become lighter.

I have hitherto spoken of the legislation which affects that class of air pollution which may be called chemical; that which arises from the gases thrown off from chemical works, chiefly acid gases. There are, however, many sources of air pollution, especially those which arise from decomposing animal and vegetable matter, from drains, from such trades as fish driers, blood boilers, horse slaughterers, tanners, and the like. The law concerning such is contained in the Public Health Act of 1875, Section 114. The law is administered by the local sanitary authority, who can be moved to action by the medical officer of health, two medical practitioners, or by ten inhabitants of the district. Fines may be imposed ranging from £2 to £200. In order to cope with the air pollution which may proceed from noxious trades such as those just mentioned, no scientific inspection is necessary, the human nose is a sufficiently accurate instrument of investigation, and they may safely be left to the local sanitary inspector.

Hitherto I have made no mention of that great and widespread source of air pollution, common coal smoke. It is the most extensive and the most ancient source of it; the amount of the injury it does us can never be told. It has a twofold sting; in the first place it spreads a gloom over our towns, providing a constant supply of dirt of a kind that insinuates itself everywhere; and secondly, it fills the air with an acid gas, injurious alike to animal and vegetable health, and destroys metal-work and the solid masonry of our buildings. From its earliest appearance it has been decried as a nuisance, laws have been levelled against it, yet it still holds its own in spite of king or parliament.

In the year A.D. 1316, Parliament presented a petition to King Edward II., praying that he would issue his royal proclamation to forbid the use of coal in London, and thus put a stop to the new nuisance then already much complained of. Till now wood had been the only fuel; as the population, however, increased, the forests were cleared and it became less plentiful. Coal, reached at first without much mining effort, was used in its place, and shortly before the date mentioned ships freighted from Newcastle with the now familiar mineral reached London. There, used as a fuel in manufacturing operations, it made its presence known by the black smoke it produced, pretty much as it does at present. Disgusted with this defilement of the then smokeless air of London, the citizens cried out against it, and we learn that a proclamation was issued forbidding its use.

Necessity, however, knows no law, and leaps over even a royal proclamation. In a few years the scarcity of wood as fuel becoming even more felt, while the economy and the efficiency of the new, though smoky, fuel was more and more acknowledged, it crept again into use, and the prohibition ceased to be held binding. For a long time London, mainly on account of its size, was the most smoky city in the kingdom, but in recent times, since the more general application of steam power to the various manufacturing processes of the country, many northern towns, some even of moderate size, have quite carried off the palm from the metropolis for smoky blackness. If any Londoner doubt it, I would advise a visit to some of the mills in Lancashire and large manufacturing works in the Midland counties to the neighbourhood of Middlesbrough-on-Tees, and of many towns in Scotland; and, if last, not least in sooty shadow, the otherwise beautiful Clyde itself, and the lovely lochs which open on the Firth, all made dismal and grimy by the belching forth from steamboat funnels of pitchy gases, which missing the proper moment of burning, to add heat to the boiler, rush out in such filthy volume as to obscure the landscape and paint the heather-decked hillsides and the blue sea one dismal hue.

All will acknowledge this to be a nuisance, and all engineers will admit that it is curable. On this point I myself claim to speak with authority as an engineer and as a chemist, and I say decidedly that in nearly all cases the sending out of black coal smoke may be avoided. To support this I could bring testimony in abundance, and I have done this sufficiently in my reports under the Alkali Act for the years 1885 and 1886.

In 1819, a Select Committee of the House of Commons was appointed, to inquire how far persons using steam-engines and furnaces could erect them in a manner less prejudicial to public health and comfort. The committee reported that, "so far as they have hitherto proceeded, they confidently hoped that the nuisance, so universally and so justly complained of, might at least be considerably diminished, if not altogether removed." In 1843, another Select Committee "inquired into the means and expediency of preventing the nuisance of smoke arising from fires at furnaces." They concluded by recommending "that a Bill should be brought into Parliament to prohibit the production of smoke from furnaces and steam-engines."

The legislation which has followed is not as trenchant as that of Edward II., to which I have already alluded. He decreed that since, on burning coal, smoke was emitted, the use of coal must cease. Our law is not quite so violent. In the Public Health Act, 1875, it is decreed that black coal-smoke is a nuisance, and those who cause its emission are indictable by summary procedure. The enforcement of the law is in the hands of the local sanitary authority, and section 92 declares it to be their duty "to enforce the provisions of any Act in force within their district requiring fireplaces and furnaces to consume their own smoke." To this, however, there is a saving clause in favour of furnaces for the smelting of ores, or for calcining, puddling, or rolling of iron. This weakens the Act very much, but a more radical source of weakness is that the administration of the Act is in the hands of the local sanitary authority. As the manufacturers, the smoke producers of the district, are usually well represented on the local board, it is not to be wondered at that the smoke prevention clauses are not very strictly enforced.

For London, a special Act was passed in 1853, the Metropolitan Smoke Nuisance Abatement Act. The working of

this is in the hands of the Commissioners of Police, and a very great improvement was effected in the manufacturing districts of the town. A marked improvement was observed in the small steamboats which ply above London Bridge as soon as this, the so-called Lord Palmerston's Smoke Act came into force. It was wonderful how much smoke so small a boat could make, now all are smokeless, and the benefit was felt at once. Among signs of this is the changed aspect of the Temple Gardens, which abut on the river. Now flowers and delicate plants flourish there during the summer months, showing as gay a sight as can be witnessed in any country town, while before the passing of the Act all was dismal and smoke polluted. —*J. Soc. Arts.*

*(To be continued.)*

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

The improvement noted last week has been wanting in staying power, and the market is again as weak as, if not weaker, than formerly. Bleaching powder is perhaps the best held, in the department of the local supply at least; but even here there has been a shade of loss, and quotations lean if anything to the fall. Transactions in sulphate of ammonia have been extremely limited, and value has continued steadily downwards. To-day £11 5s. is the top price f.o.b. Leith, but the market is essentially weak, and *bonâ fide* business would probably have little difficulty in passing at a slightly lower figure. Paraffins are all languid, and makers are waiting a little impatiently for the approach of customers with their orders for the new season, as has been the custom of the trade; but consumers have shied partly at the late associated increase of value in oils, scale, and wax, and they now put off as long as they can, possibly in the hope of some rupture amongst makers. The Broxburn Oil Company is to pay 5 per cent. (against 15 last year and 25 the year before) and this is likely to prove a solitary case of return over the trade, at least as regards those who balance in the spring. General prices current are:—Soda crystals, 40s. net Tyne; alum in lumps £5, less 2½ % Glasgow; borax, English refined £31, and boracic acid, £41 net Glasgow; soda-ash, 48/52°, 1d., less 5 % Tyne; caustic soda, white, 76°, £8 5s.; 70/72°, £6 17s. 6d.; 60/62, £6; and cream, 60/62°, £5 17s. 6d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5, and 1 cwt. casks, £5 5s., net Tyne; refined alkali, 48/52°, 1½d., less 2½ % Tyne; saltcake, 21s., less 2½ %, f.o.r. Glasgow; bleaching powder, £7 15s. to £7 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 10/4½; chlorate of potash, 5¾d., less 5 % any port; sulphate of ammonia, £11 10s., f.o.b. Leith; sulphate of copper £22; paraffin scale, hard, 2 1/16d., soft, 2d.; paraffin wax, 120° semi refined, 2 1/16d.; paraffin spirit, 4½d.; burning oil, 5¾d. to 6d.; lubricating oil, 865°, £5 to £5 5s.; 885°, £6 to £6 10s.; and 890/95°, £7 10s. to £7 15s. Western imports have included, at Greenock, 19,778 bags, and 3,032 baskets sugar; at other harbours 6,175 tons iron ore, and 100 tons phosphate rock.

## THE LIVERPOOL MINERAL MARKET.

During the week most classes of minerals have been pretty brisk, but, notwithstanding, prices remain without material alteration. Maganese: There are no arrivals to report this week, and prices are unchanged. Magnesite (containing 98 per cent. of carbonate of magnesia) unaltered at 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite (Irish Hill brand) continues in good demand at 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk in good request, and bringing full prices—87s. 6d. to 90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) still in good request. Selected crystal lump is scarce at £6; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumicestone in demand; ground, at £6. 10s. to £7; specially selected lump, finest quality, £10 to £10 10s. Iron ore continues to be inquired for—Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s.; Cumberland, 9s. to 9s. 6d. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone continues in fair demand at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady, 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore still in fair demand, and prices are firm, with a probability of an increase. Antimony ore firmer; £16 to £22 for fair quality. Antimony metal unchanged. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine) 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar, 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; Italian and Bohemian, £4. to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50. China Clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn).

## THE LIVERPOOL COLOUR MARKET.

Colours are without change. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s. Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s., to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## LIVERPOOL CHEMICAL MARKET.

Chemicals have ruled steady during the week. Soda-ash 1d. up. Caustic soda: 60 % white, £6; 60 % cream, £5. 17s. 6d.; 70 % white, £7; 74 % £7. 10s.; 76 % £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda, 10s. to 10s. 6d. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 15s. for hardwood, and £7. 10s. softwood. Saltcake at 21s. Bichromate of potash at 4¾d. Bichromate of soda, 3¾d. Carbonate of potash, £18 to £20. Chlorate of potash, 6d Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9; hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. to £12. 10s., strong. Lump little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16. to £17.; chloride of manganese, £20 per ton.; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia; White, 22s. Refined borax, unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Pearl ashes, £2. 3s. Chloride of zinc (solid), £18.

## MISCELLANEOUS CHEMICAL MARKET.

Slackness of trade is still the general complaint, and there are some further reductions of price to note for the past week. The tin market has at last collapsed, and price of the metal has thus far declined £74 per ton. Lead is also rather easier, and trade in all the lead salts is remarkably quiet. Foreign white acetate of lead is offering freely at £25. 15s. c.i.f. Tin crystals are merely nominal at 8d. per lb. Copper is firm at £80. 5s., and sulphate of copper is without change at about £21, though some resellers will shade this price by 5s. per ton. Acetates of lime are moving slowly, brown at £8. 15s. and grey at £13. 5s. Bleaching powder is in good demand, and makers are well engaged with orders; price is maintained at £7. 7s. 6d. rails Lancashire and Tyne. Alkali is also in fair request, and soda-ash shows no sign at present of falling from its average value of about 1d. per degree at Liverpool. Caustic soda quotations are barely maintained, but there is no pressure of stock, and prices are unaltered meantime. Carbolic acids are more freely offered, and prices are rather lower if anything; crude is fairly well held meantime, but there are expectations of the price giving way shortly.

## THE TAR PRODUCTS MARKET.

It cannot be said that benzol is in any more satisfactory position than it was last week, in fact from some quarters we hear that decidedly a weaker tone prevails, while the refiners are not so anxious now to fill themselves with crude naphtha at even current rates. We have over and over again pointed out the high prices being given for tar; we have had Mirfield, Manchester, and Leeds at prices varying from 24s. 6d. to 26s., and it is rumoured that the Glossop will not cost the contractor less than 30s. at his works. Three shillings is to-day the outside value for 90's benzol, and 2s. 6d. for 50/90; but it would be much nearer the mark to say that business is entirely at a standstill as far as benzol is concerned. All other tar products are reported a shade easier, but still the values remain unchanged.

## THE SULPHATE OF AMMONIA MARKET.

Sulphate has continued to fall during the week, and its value to-day can only be reckoned as £11., or even a shade less, at Hull, while Beckton stands at £11. 12s. 6d. By many this is not considered a legitimate fall, and has only resulted from the action of the makers in agreeing to sell at the declining prices which the general stampede of a week ago had produced. This fall will be a nice plum for those dealers who no doubt will have now recovered from the effect of their injudicious sales last year, and who will continue to take it out of the makers so long as the opportunity presents itself.

# New Companies.

Algerian Copper Company Limited.—Capital, £12,000 in £10 shares.
Antifriction Conveyor and Grinding Company Limited.—Capital, £10,000 in £1 shares.
Bradford Patent Dyeing Company Limited.—Capital, £2,100 in £10 shares.
Colorado Gold and Silver Exploration Company Limited.—Capital, £100,000 in £1 shares.
Colossus Silver-lead Ore Company Limited.—Capital, £30,000 in £1 shares.
Dordogne Mineral and Smelting Company Limited.—Capital, £100,000 in £10 shares.
Driffield Pure Linseed, Cotton, and "Union" Cake Company Limited.—Capital, £54,000 in £25 and £10 shares.
W. H. Flett Limited (Preserve Manufacturer).—Capital, £20,000 in £10 shares.
Gravel Gold Mines of Colombia Limited.—Capital, £100,000 in £1 shares.
Gwendraeth Tin Plate Company Limited.—Capital, £50,000 in £50 shares.
Gwin and Singer United Tin Mines Limited.—Capital, £45,000 in £1 shares.
Ione (Nevada) Silver Mines Limited.—Capital, £120,000 in £1 shares.
Jay Hawk Mining Company Limited.—Capital, £175,000 in £1 shares.
Mid-Cumberland Silver-lead and Blende Mining Company Limited. Capital, £20,000 in £1 shares.
Montrose Gold Mining and Exploration Company Limited.—Capital, £70,000 in £1 shares.
Moodie's Golden Hill Gold Mining Company Limited.—Capital, £33,000 in £1 shares.
Namaqua Copper Company Limited.—Capital, £200,000 in £1 shares.
New Drws-y-Coed Copper and Silver-lead Company Limited.—Capital, £50,000 in £1 shares.
Patent Cement Company of England Limited.—Capital, £300,000 in £5 shares.
Silver Crown Limited.—Capital, £30,000 in £1 shares.
Silver Spring Mineral Water Company Limited.—Capital, £1,050 in £10 shares.
South Down Metal, Chemical, and Brick Company Limited.—Capital, £40,000 in £50 shares.
Tapia Iron Ore Mining Company Limited.—Capital, £15,000 in £1 shares.
Thorneburry Light Company Limited.—Capital, £20,000 in £5 shares.
Thynne's Patent Pipe Joint Company Limited.—Capital, £2,000 in £10 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Plate Powder.** S. J. Payne. 5866. April 20.
**Electric Batteries.** R. Rauschke. 5870. April 20.
**Hydrocarbon Motor Engines.** W. P. Theermann. 5872. April 20.
**Perfuming Paint Enamels.** T. Fisher. 5878. April 20.
**Maturing Cement.** A. McAra. 5881. April 20.
**Closing Tap Holes of Barrels.** J. Harrison. 5891. April 20.
**Composition for Ships' Bottoms.** R. J. Paris. 5893. April 20.
**Drying Apparatus for developing Aniline Dyes.** T. Hill and T. Mayfield. 5908. April 20.
**Blue Colouring Matters.** C. D. Abel. 5909. April 20.
**Azo Colouring Matters.** C. D. Abel. 5910. April 20.
**Filling Paraffin Lamps.** W. Smith. 5912. April 20.
**Hydrocarbon Engines.** H. H. Lake. 5914. April 20.
**Fire Resisting Materials.** F. M. Spence and D. D. Spence. 5917. April 20.
**Explosive Compounds**—(Complete Specification). A. Kuhnt and R. Deissler. 5949. April 21.
**Extracting Magnesia from Sea Water.** L. G. G. Daudenart. 5953. April 21.
**Drying by means of Hot Air or Steam.** T. W. Newman. 5956. April 21.
**Safety Lamps.** E. Charles and C. Wells. 5962. April 21.
**Metal Paper and Cardboard.** E. Schöder. 5963. April 21.
**Elevating and Conveying Pulverulent Materials.** H. Delhaye. 5965. April 21.
**Oil Extractors**—(Complete Specification). H. J. Haddan. 5971. April 21.
**Steam Generation for Distilling purposes.** T. J. Rayner. 5972. April 21.
**Magnesium Light for Photography.** E. Edwards. 5974. April 21.
**Apparatus for Drying with Hot Air**—(Complete Specification). W. A. Gibbs. 5980. April 21.
**An Improved Soap.** T. S. Saunders. 5981. April 21.
**Obtaining Fatty Acids and Glycerine.** J. Lekowitsch. 5985. April 21.
**Composition for Preservation of Iron.** E. F. Wailes and E. J. Dove. 6012. April 23.
**Treatment of Brewers' or Distillers' Worts.** W. Hucks. 6026. April 23.
**Dyeing Cotton.** H. Gross. 6029. April 23.
**Defecators for Saccharine and other liquids.** R. Harvey. 6030. April 23.
**A New Means of Imparting Heat to Air.** W. P. O'Neill and F. O'Neill. 6031. April 23.
**Utilising Scrap Leather.** T. Woodward and W. W. Foster. 6035. April 23.
**Automatic Production of Antiseptic Sprays.** A. R. Upward. 6043. April 23.
**Heating Liquids and Maintaining them at a certain Temperature.** O. Imray. 6047. April 23.
**Inflammable Gases for Tricycles, etc.** A. W. Wilson. 6048. April 23.
**Ventilating Sewers.** S. Welsh. 6051. April 24.
**Purifying Sewage and Impure Waters.** G. A. J. 'Schott. 6070. April 24.
**Carburetted Air Motors.** W. P. Thompson. 6088. April 24.
**Sugar Cane Mills.** G. Fletcher. 6098. April 24.
**Mills for Crushing and Grinding**—(Complete Specification). F. O. Lindheimer. 6101. April 24.
**Extracting Metals from Ores**—(Complete Specification). P. Jensen. 6102. April 24.
**Treating Auriferous Ores.** J. Weirich. 6104. April 24.
**Preparing and Drying China Clay.** A. S. Chinnock, C. E. McLaren, and A. Campbell. 6105. April 24.
**Hot Air Motors Heated by Gas.** C. Wells and J. T. Pickburn. 6108. April 24.
**Obtaining Power from the Heat of Waste Steam.** C. Wells. 6109. April 24.
**Agitating or Mixing Substances.** W. Smith. 6124. April 25.
**Permanent Cure for Foot Rot.** K. Sando. 6130. April 25.
**Electric Arc Lamps.** F. R. Boardman and F. Teague. 6133. April 25.
**Coating the Bottom of Iron Ships.** T. Woolley. 6137. April 25.
**Stirring, Mixing, and Incorporating Substances**—(Complete Specification). R. H. Heenan. 6150. April 25.
**Ammonia Carbonate Baking Powder.** R. E. Chatfield. 6151. April 25.
**Improvements for Blowing and Moulding Glass.** J. Armstrong. 6153. April 25.
**Improvements in Cheques.** W. H. Howarth. 6155. April 25.
**Chemical Fire Engines.** J. Hall and Js. Hall. 6160. April 25.

**Smoke Consuming Arrangement.** W. P. Hoblyn. 6169. April 26.
**Production of Sulphur from Sulphuretted Hydrogen.** E. W. Parnell and J. Simpson. 6175. April 26.
**Regenerative Gas Lamps.** W. A. Fourness. 6188. April 26.
**Preparing Carbons for Electric Lighting**—(Complete Specification). C. A. J. H. Schroeder. 6191. April 26.
**Producing Cold by Means of Waste Heat**—(Complete Specification). C. Tellier. 6212. April 26.
**Improved Hydraulic Motor or Meter.** A. Goodwin, jun. 6219. April 26.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

J. Hardman & Brothers, Radcliffe and Pilkington, Lancashire, dyers, bleachers, and printers.
Sharp & Newland, Minerva-street, Hackney-road, glass manufacturers.
Mountford & Thomas, Hanley, earthenware manufacturers.
A. Bullock, C. F. O. Cornes, & J. Cornes, Hanley, earthenware manufacturers.
Hammersley & Co., Longton, china manufacturers.
Willshaw & Sadler, Burslem, earthenware manufacturers, as far as regards G. Willshaw.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Kroll, Ludwig (trading as L. Kroll and Co., and the British Hygienic Company), Blundell-street, Caledonian-road, late of Mark-lane, City, chemical manufacturer.
Meakin, Richard, Newton Burgoland, Leicestershire, brick and tile manufacturer.
Rickard, William Henry (trading as the Swansea Pottery Company), Swansea, earthenware manufacturer.

### Adjudications.

Jackson, John Perkins, Waterloo, Lancashire, and Liverpool, formerly managing director of J. P. Jackson and Co. Limited, now managing director of the Facile Manufacturing Company Limited, engineer and managing director of a public company.
Rickard, William Henry (trading as the Swansea Pottery Company) Swansea, earthenware manufacturer.
Howarth, Robert Scowcroft, Cheetham, Manchester, chemical manufacturers' manager.

### First Meetings and Public Examinations.

Dixon, Cecil Bernardino, and Dixon, Sara (trading as Dixon and Cardus), Northam, Southampton, oil-cake and artificial manure manufacturers. May 18, Chamber of Commerce, 145, Cheapside; May 4, Court-house, Southampton.
Kelly, John Anderson, Ida-street, Bromley-by-Bow, oil and colourman. May 10, 33, Carey-street, Lincoln's-inn; May 31, 34, Lincoln's-inn Fields.
Exley, Thomas (trading as J. Exley and Son), late of Horsforth, near Leeds, now of Pudsey, near Leeds, late tanner. May 10, Official Receiver's offices, Leeds; May 29, County Court-house, Leeds.
Howarth, Robert Scowcroft, Cheetham, Manchester, chemical manufacturers' manager. May 4, Official Receiver's offices, Manchester; May 16, Court-house, Manchester.
Rickard, William Henry (trading as the Swansea Pottery Company), Swansea, earthenware manufacturer. May 8, Official Receiver's offices, Swansea; May 24, Town Hall, Swansea.

### Notices of Dividends.

Orchard, Arthur Bishop Carey, Ebbw Vale, Monmouthshire, chemist and druggist. First and final dividend of 4s. 11¼d., May 4, Official Receiver's office, Merthyr Tydfil.
Hunt, Arthur, Exeter, chemist and druggist. Final dividend of 1s. 3¼d., after May 7, Messrs. R. Southcott and Co.'s, 1, Post Office-street, Bedford Circus, Exeter.
Egleton, Robert Tanner, Montreal-terrace, Kilburn, Great James-street, Lisson-grove, Marylebone, and Wormwood-street, City, oil and colourman and oilman's valuer. First and final dividend of 10½d., any day except Saturday, Chief Official Receiver's offices, 33, Carey-street, Lincoln's-inn.
Goulden, Robert (separate estate), Seedley, Pendleton, Lancashire, calico printer, trading with J. H. James as the Seedley Printing Company. First and final dividend of 3d., May 23, 44, Brown-street, Manchester.
Paxton, Henry, The Grange, Bermondsey, and Milton-street, City, tanner and currier. Second and final dividend of 3d., May 18, Weaver's Hall, 22, Basinghall-street, London.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending April 21st.*

**Acetate of Lime**—
U. S., 281 bgs. Robinson & Co.
" 281 " Allan Bros.

**Acetic Acid**—
Holland, 10 bkts. R. W. Greeff & Co.
" 5 cbys. Spies Bros. & Co.

**Acetate of Soda**—
France, 9 cks Hunter, Waters & Co.

**Alkali**—
Holland, 200 c. W. G. Taylor & Co.
" 240 Howard & Sons
France, 220 F. W. Berk & Co.
" 110 L. R. Kent
" 104 Petri Bros.

**Bones**—
Brisbane, 8 t. Leach & Co.
Fremantle, 8 t. Flack, Chandler & Co
Sydney, 7 t. Goad, Rigg & Co.
" 7 Leach & Co.
U. States, 15 t. A. & W. Nesbitt
" 12 "

**Bromine**—
Germany, 19 cs. T. Jordan & Co.

**Bone Meal**—
E. Indies, 250 t. Gonne, Croft & Co.
" 250 G. Bennett & Sons

**Brimstone**—
Italy, 10 t. H. S. Smith & Co.

**Barytes**—
Germany, 5 cks. T. Finn
Holland, 22 " A. Boetz
" 44 " G. Ward & Sons
" 126 " W. Harrison & Co.
Belgium, 22 " Proprs. Scott's Wharf
" 22 " E. W. Carling & Co.
" 21 " W. Harrison & Co.
Germany 22 " O'Hara & Hoar

**Cream Tartar**—
France, 5 cks. J. Puddy & Co.
" 5 " Sutcliffe, Gosden & Co.
" 25 " Webb, Warter & Co.
" 5 " W. V. Robinson & Co.
Italy, 243 bgs. F. Gunter & Co.
" 20 cks. W. C. Bacon & Co.
" 23 " Howard & Sons
" 20 " W. Allen
Spain 55 bgs. J. Turner & Co.
" 4 cks. Webb, Water & Co.
" 6 " "

**Caoutchouc**—
E. Indies, 34c. T. Merry & Son
Colon 11 Kebbel, Son & Co.
Cape 10 D. Currie & Co.
" 29 J. Owen.
Colombia 5 Stiebel Bros.
Cape 20 W. M. Smith & Sons
Greytown 8 R. G. Hall & Co.
E. Indies 93 Ralli Bros.
" 54 Wrightson & Son
Cape 30 D. Currie & Co.
" 30 W. M. Smith & Sons
Zanzibar 313 Kleinwort, Sons & Co.

**Chemicals** (*otherwise undescribed*)
France £11 L. & S. K. D. Co.
Germany 210 T. H. Lee
" 433 A. & M. Zimmermann
Holland 8 J. Sauer
Germany 6 Proprs. Hay's Wharf
France 32 Spies Bros. & Co.
Holland 120 F. W. Berk & Co.
" 33 R. Morrison & Co.
France 9 Atkins & Nisbet
Germany 63 T. H. Lee
" 30 E. W. I. D. & Co.
" 183 A. & M. Zimmermann
" 8 Proprs. Hay's Wharf

**Copper Sulphate**—
Germany, 28 cks. A. Henry & Co.

**Dextrine**—
Germany 100 bgs. J. Barber & Co.
" 120 " Hermann, Keller & Co.
" 50 " G. Boor & Co.
" 15 " C. F. Gerhardt
" 35 " H. Lorenz & Co.
" 50 " "

**Dyestuffs**—
**Cutch**
Germany 450 bxs. Meden Bros. & Co.
E. Indies 1300 bxs. Kleinwort & Sons
Denmark 30 " H. Grey, jun.
E. Indies 160 " Prs. Brook's Whrf.
Aden 32 cs. Kebbel, Son & Co.
E. Indies 200 bxs. Wallace Bros.
" 2300 " Hoare, Wilson & Co
" 1599 " Wrightson & Son
" 238 " Anderson, Weber and Smith
" 1500 " Leach & Co.
" 500 " J. Owen

**Tanners' Bark**
Belgium 80 t. Brocklebank & Sons
France 1 L. Bonnamy
Belgium 42 Vokins & Co.

**Tanners' Bark**—*continued.*
Adelaide 17 t Devitt & Hett
U. States 19 Lindsay, Bird & Co

**Extracts**
Canada 200 cks. A. J. Humphery
Denmark 11 " Bailey & Leetham
U. States 10 bxs. W. Burton & Sons
Norway 200 " "
" 2 cks. Johnsen & Jorgensen
France 50 " Levinstein & Sons
Denmark 1 " Petty & Co.
U. States 100 bxs. Prs. Brook's Whrf.
E. Indies 740 pkgs. Adamson and Ronaldson
" 16 " E. & W. I. D. Co.

**Indigo**
E. Indies 12 chts. E. & W. I. D. Co.
" 165 " Arbuthnot, Latham and Co.
" 17 " L. & S. K. D. Co.
" 10 " Ripley, Roberts & Co
" 6 " Vokins & Co.
Phillipines 50 cs. Ross & Deering
Colon 10 srns. H. S. Lefevre & Co.
" 2 bgs. Chalmers, Guthrie & Co
E. Indies 25 chts. L. & S. K. D. Co.
" 92 " E. & W. I. D. Co.
" 10 " G. N. R. Co.
" 3 cs. J. T. Morton
La Libertad 43 srn. Chalmers, Guthrie & Co.
" 14 " Isaac & Samuel
San Juan del Sur 1 srn. H. S. Lefevre
E. Indies 63 chts. L. & S. K. D. Co.
" 52 " Arbuthnot, Latham and Co.
" 45 " E. & W. I. D. Co.
" 103 " L. & S. K. D. Co.
Java 5 " Patry & Pasteur

**Gambier**
E. Indies 259 bgs. A. Frey & Co.
" 176 " H. Lambert
" 406 " Beresford & Co.
" 370 " Hoare, Wilson & Co.
" 13 cs. Brinkmann & Co.
" 241 bgs. Elkan & Co.
" 260 " Beresford & Co.
" 183 " J. Owen
" 165 bls. J. Swire & Sons
" 826 " Adamson & Co.
" 12 cs. L. & S. K. D. Co.

**Myrabolams**
E. Indies 857 bgs. Marshall & French
" 500 " Armitage, Fry & Co.
" 370 " Beresford & Co.

**Anthracene**
Holland 39 cks. Burt, Boulton & Co.

**Argols**
Italy 608 bgs. B. Jacob & Sons
Natal 3 " Barber Bros.
Spain 391 " B. Jacob & Sons
Italy 2 cks. J. Stacey

**Aniline**
Holland 10 cks. Rosenberg, Loewe and Co.
Natal 20 cs. Union Lighterage Co.

**Turmeric**
E. Indies 100 bgs. Marshal & French

**Orchella**
E. Indies 9 bgs. Hale & Son

**Divi Divi**
Carthagena 300 bgs. J. Harman & Co

**Shumac**
Italy 15 bgs. Capt. Haydon

**Saffron**
Spain 1 cs. Burgoyne, Burbridges and Co.

**Cochineal**
Canaries 24 bgs. W. M. Smith & Sons

**Gutta Percha**—
E. Indies, 237 c. Huttenbach & Co.
" 45 J. H. & G. Scovell

**Glucose**—
Germany 108 c. E. & W. I. D. Co
" 220 Hyde, Nash & Co.
" 36 W. Balchin
" 35 F. Stahlschmidt & Co.
" 72 J. Knill & Co.
" 100 Barrett, Tagant & Co.
France 200 H. A. Litchfield & Co
Germany 8 J. Connell
" 171 Pr. Chamberlain Wrf.
" 200 Drummond & Co.
U. States 540 G. Doo
Germany 425 M. D. Co.
" 100 C. Southwell
" 50 Hyde, Nash & Co.
" 250 Middleton, Son & Co.
" 10 Spies Bros. & Co
" 100 J. Knill & Co.
" 180 "
" 8 Pr. Chamberlain Wrf.
" 100 Baxter & Hoare
" 72 Union Lighterage Co.
France 200 M. H. Voss
Germany 100 P. W. Hove
" 203 E. Pink & Sons
" 160 Pr. Chamberlain Wrf.
" 104 Tolme & Runge

**Gypsum**—
France 175 t J. Gibbs & Co.
" 330 J. Burnett & Sons

—
Beresford & Co.
„
cs. Forbes, Forbes & Co
L. & S. K. D. Co.
E. & W. I. D. Co.
L. & S. K. D. Co.
W. M. Smith & Sons
L. & S. K. D. Co.
cks. J. Brown & Son
—
cks. Charles & Fox
Blundell & Spence
Brandram Bros. & Co.
**Lead**—
cks. Charles & Fox
**Sulphate**—
bgs. T. Farmer & Co.
„ Lawes Manure Co.
t. London Manure Co.
cks. H. Lambert
bgs. F. W. Berk & Co.
**Bicarbonate**—
ks. A. & M. Zimmermann
**ous Acid**—
c. C. F. Gerhardt
**Lime**—
t Lawes Manure Co.
**Rock**—
t Moeller, Graetz & Co.
Anglo-Contl. Guano Wks
Moeller, Graetz & Co.
„
s Cloid, Routledge & Co.
**Wax**—
766 brls. J. H. Usmar & Co
280 „ H. Hill & Sons
80 „ J. H. Usmar & Co.
—
brls. Linck, Moeller & Co
cks. L. Fischel
brls. Leach & Co.
o brls. Berlandina Bros.
—
17 cks. P. Hecker & Co.
8 „ G. Rowney & Co.
91 „ J. Thedder & Sons
93 „ H. W. Ison
98 „ R. G. Hall & Co.
**Muriate**—
09bgs. Perkins & Homer
**Nitrate**—
11 bgs. Montgomery & Co
77 „ H. Bath & Sons
—
s t. Anglo Guano Wrks
—
t. Petri Bros.
o Hunter, Waters & Co.
E. & W. I. D. Co.
—
o cks. J. Hall & Son
8 „ P. Hecker & Co.
o „ T. Merry & Son
bgs. E. & W. I. D. & Co.
„ Clift, Nicholson & Co.
„ E. & W. I. D. & Co.
**Lead**—
11 cks. Middleton & Co.
—
cks. Un. Lighterage Co.
pkgs. H. Lambert
ck. Johnsen & Jorgensen
**Acetate**—
cks. Lister & Biggs
„ W. G. Blagden
**Tar**—
cks. F. W. Berk & Co.
**Acid**—
o cks. Un. Lighterage Co.
11 „ Webb, Warter & Co
kgs. Christopherson & Co
cks. Webb, Warter & Co.
„ „
„ „
„ Northcott & Sons
**Powder**—
10 cs. Prs. Hay's Wharf
—
brls. French Asphalte Co
**Pine**—
cs. H. Brooks & Co.
brls. G. Rahn & Co.
cs. H. Kohnstann
cks. A. Henry & Co.
cs. Becker & Ulrich
cks. F. Williams
„ Henderson, Craig Co.
**Tile**—
50 cks. Hubbuck & Son
45 brls. M. Ashby
29 „ Beresford & Co.

## LIVERPOOL.

*Week ending April 25th.*

**Alum**—
Rotterdam, 23 cks.
„ 41 „
**Barytes**—
Hamburg, 46 cks.
Rotterdam, 22 brls.
**Borax**—
San Francisco, 305 sks.
Havre, 31 cks. Cunard S.S. Co.
**Bone Meal**—
Bombay, 4,698 bags.
**Bitumen**—
Beyrout, 3 cs. F. Poche & Co.
**Bones**—
Jaffa, 128 t. J. Jowett & Sons
Alexandria, 596 bags.
**Cream Tartar**—
Barcelona, 5 cks. Sachse & Klemm
„ 12 „
Tarragona, 5 „
Bordeaux, 5 „
Barcelona, 5 hds. F. Reid & Co.
**Chemicals** *(otherwise undescribed)*
Rotterdam, 12 cks.
**Caoutchouc**—
Ambriz, 10 cks. Taylor, Laughland and Co.
„ 1 bg. 1 ck. Dumas, Beraud and Co.
„ 2 brls. Samson de Liagre
Muculla, 8 cks. Taylor, Laughland and Co.
„ 16 bgs. Samson de Liagre
Quinzas, 17 bgs. 2 brls. „
Kinsembo, 16 bgs. „
„ 5 cks. Jaffi & Son
„ 2 „ Dumas, Beraud and Co.
Mussera, 1 „ „
„ 2 cks. 7 bgs. Samson de Liagre
Ambrizette, 22 bgs. „
„ 21 „ 4 cks. S. Pearson
„ 12 cks. Taylor, Laughland & Co.
„ 3 „ Dumas, Beraud and Co.
Cacongo, 25 bgs. Samson de Liagre
Congo, 2 cks. S. Pearson
„ 3 „ 40 bgs. Dumas, Beraud and Co.
Black Point, 8 cks. 1 cs. Pinto, Leite and Nephew
Loango, 5 cks. Edwards Bros.
Nyanza, 2 bgs. „
Elobey, 17 cks. J. Holt & Co.
Victoria, 2 bdls. 7 cs. 1 ck.
Cameroons, 3 brls. A. Herschell
„ 3 cks. R. & W. King
Old Calabar, 5 cks. Pickering & Berthoud
„ 4 „ Harvard & Co.
„ 5 bgs. Alexander & Christie
Salt Pond, 4 brls. 1 cs. Pickering and Berthoud
„ 1 „ Edwards Bros.
„ 5 „ D. Oppenheimm
Cape Coast, 14 brls. F. & A. Swanzy
„ 2 „ 1 cs.
„ 7 „ Pickering & Berthoud
Manaos, 72 cs. R. Singlehurst & Co.
„ 568 bgs.
Itacoatiara, 4 cs. „
„ 13 „
Para, 11 cs. Bieber & Co.
„ 31 „ A. Herman & Co.
„ 331 „
**Copper Precipitate**—
Baltimore, 100 brls. Greenbank Alkali Co.
**Dyestuffs**—
**Indigo**—Calcutta, 31 chts.
**Myrabolams**—Bombay, 3,157 bags
**Divi Divi**—Rio Hacha, 155 t E. Brownbill & Co.
**Argols**—Bordeaux, 73 cks.
**Gambier**—Singapore, 427 bls.
**Extracts**—New York, 36 brls.
Rouen, 13 cks. Co-op. W'sale Soc. Ltd.
**Glucose**—
Hamburg, 50 cks.
New York, 125 brls.
Rouen, 5 cks. Co-op. W'sale Soc. Ltd.
**Glycerine**—
Rouen, 5 dms.
„ 33 cks. Co-op. W'sale Soc. Ltd
**Isinglass**—
Para, 7 cs. Gunston & Co.
**Litharge**—
Rotterdam, 6 cks.
**Pitch**—
Amsterdam, 42 cks. J. R. Peace & Co.
Rotterdam, 49 „ „
Antwerp, 4 cks. J. T. Fletcher & Co.
**Potassium Carbonate**—
Hamburg, 31 cks.
Rotterdam, 10 „
**Phosphate Rock**—
Oruba, 358 t. Phospho-Guano Co
**Pyrites**—
Huelva, 1,413 t. Matheson & Co.
„ 1,616 „
„ 1,544 „
**Potash**—
Boston, 30 brls.
Rouen, 11 cks. Co-op. Soc. Ltd.
**Phosphates**—
Ghent, 1,250 bgs.
**Salts of Potash**—
Hamburg, 305 bags.
„ 1,668 „
**Stearine**—
Hamburg, 147 bags.
**Sugar of Lead**—
Hamburg, 44 cks.
**Saltpetre**—
Hamburg, 7 cks.
**Sodium Nitrate**—
Iquique, 6,138 bgs. H. Bath & Son
**Ultramarine**—
Hamburg, 62 cs.
Rotterdam, 24 cks.
**Verdigris**—
Bordeaux, 6 cks.
**Waste Salt**—
Hamburg, 979 bags.
„ 250 „
**Zinc Oxide**—
Antwerp, 50 brls.

## GLASGOW.

*Week ending April 28th.*

**Acetic Acid**—
Rotterdam, 17 blns. Rankine & Son
**Alum**—
Rotterdam, 77 cks.
**Bone Meal**—
Bombay, 269 bags
Calcutta, 15,500 pkgs.
**Barytes**—
Rotterdam, 65 cks.
**Chemicals** *(otherwise undescribed)*
Rotterdam, 6 cks. J. Rankine & Son
Hamburg, 2 cs
**Dyestuffs**—
**Argol**—Marseilles, 110 sks.
**Indiarubber**—
Calcutta, 67 bags
**Potash**—
Rotterdam, 52 cks.
**Phosphate Rock**—
Antwerp, 100 t.
**Potassium Muriate**—
Hamburg, 100 bgs. J. Ewing & Son
**Potassic Salt**—
Hamburg, 5 cks.
**Sulphur Ore**—
Seville, 930 t.
**Saltpetre**—
Calcutta, 1 box samples. Ralli Bros.
Hmbrg., 24 cks. 5 kgs. Poynter & Son
**Soda**—
New York, 11 cks.
**Sulphuric Ether**—
Hamburg, 8 cs.
**Tartaric Acid**—
Marseilles, 8 brls.
**Tartar Emetic**—
Hamburg, 2 cks.
**Waste Salt**—
Hamburg, 200 bgs. Poynter & Son
„ 50 t. 50 bgs.
**Wood Alcohol**—
New York, 42 dms.
**Zinc Oxide**—
Antwerp, 45 cks.
New York, 30 brls.

## HULL.

*Week ending April 25th.*

**Alum**—
Rottrdm., 42 cks. W. & C. L. Ringrose
**Alumina**—
Rottrdm., 3 cks. W. & C. L. Ringrose
**Acetic Acid**—
Rotterdam, 15 bkts. Lawson & Sons
**Barytes**—
Antwerp, 55 brls. H. F. Pudsey
**Chemicals** *(otherwise undescribed)*
Dunkirk, 158 pks. Wilson, Sons & Co.
Hamburg, 76 cks. „
Antwerp, 48 „ „
Rotterd'm, 10 „ G. Lawson & Sons
„ 3 „ Wilson, Sons & Co.
Stettin, 86 „ „
„ 10 „ „
„ 17 „ „
Dantzic, 20 brls.
**Dextrine**—
Hamburg, 43 bags
**Glycerine**—
Amsterdam, 5 cbys.
„ 5 pkgs.
**Glucose**—
Hamburg, 400 bgs. 25 cks.
Rotterdam, 6 pks. G. Lawson & Sons
Stettin, 150 bgs. 68 cks. Wilson & Sons
„ 35 cks. 2,500 bags
Hamburg, 6 cks. G. Lawson & Sons
„ 6 „
„ 200 bgs. Lofthouse & Co.
„ 10 cks.
**Gypsum**—
Stettin, 2 cks.
**Indiarubber**—
Hamburg, 5 cs. Lofthouse & Co.
**Manure**—
Dunkirk, 100 bgs. Wilson, Sons & Co.
Ghent, 172 tons. „
**Pyrites**—
Huelva, 1,153 t.
**Pitch**—
Stettin, 45 cks. Wilson, Sons & Co.
**Saltpetre**—
Hamburg, 4 pks. Wilson, Sons & Co.
**Sulphur**—
Trieste, 40 cks. 4,459 bgs. W., S. & Co.
**Salammoniac**—
Hamburg, 15 cks. Wilson, Sons & Co.
**Soda**—
Antwerp, 1 ck. Bailey & Leetham.
**Tartaric Acid**—
Rotterdam, 11 cks. Lawson & Sons
**Waste Salt**—
Hamburg, 50 t.
„ 1,300 bags

## TYNE.

*Week ending April 28th.*

**Barytes**—
Rotterdam, 9 cks. Tyne S.S. Co.
**Chemicals** *(otherwise undescribed)*
Hamburg, 1 case. Tyne S.S. Co.
**Glycerine**—
Hamburg, 1 dm. Tyne S.S. Co.
**Indiarubber**—
Hamburg, 3 cs. Tyne S.S. Co.
**Manure**—
Antwerp, 510 bgs. Tyne S.S. Co.
**Pyrites**—
Huelva, 2,033 tons. Scott Bros.
**Saltpetre**—
Hamburg, 20 cks. Tyne S.S. Co.
**Salt**—
Hamburg, 2 cks. Tyne S.S. Co.
**Ultramarine**—
Rotterdam, 5 css. Tyne S.S. Co.
**Zinc Oxide**—
Hamburg, 25 cks. Tyne S.S. Co.

## GRIMSBY.

*Week ending April 23rd.*

**Manure**—
Kainit
Hamburg, 300 bags.
**Potash**—
Hamburg, 17 cks.

## GOOLE.

*Week ending April 19th.*

**Caustic Potash**—
Calais, 44 dms.
„ 2 cks.
**Muriate**—
Rotterdam, 21 cks.
**Potash**—
Hamburg, 17 cks.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending April 24th.*

**Ammonia Muriate—**
Barcelona, 4 cks. £25

**Ammonia Carbonate—**
Bordeaux, 20 cks. £100
Sydney, 10 cs. 16
Stettin, 1 t. 2 c. 30
Melbourne, 10 14
Libau, 2 t. 12 70

**Alumina—**
Bordeaux, 7 t. 5 c. £25

**Ammonia Liquid—**
Valparaiso, 4 c. £11

**Ammonia Sulphate—**
Barbadoes, 100 t. £1,205
St. Kitts, 5 t. 3 c. 63

**Alum—**
Bourgas, 2 t. 16 c. £14

**Alum Cake—**
Calcutta, 14 t. 7 c. £60

**Acids—**
Batoum, 300 cs. £900
Colombo, 7 45

**Arsenic—**
Antwerp, 5 t. 17 c. £75

**Borax—**
Keppel Bay, 1 t. £72
Sydney, 1 t. 10 c. 46
Hamburg, 8 c. 14

**Bleaching Powder—**
Hong Kong, 12 cs. £15

**Boracic Acid (Powdered)—**
Hamburg, 12 c. £34

**Brimstone—**
Demerara, 8 t. 4 c. £43

**Bone Ash—**
Melbourne, 11 c. £45

**Chemicals** *(otherwise undescribed)*
Mauritius, 4 cs. £84
Valparaiso, 86
Hobart, 2 cks. 17
Buenos Ayres, 5 cs. 21
Cape Town, 5 pkgs. 27
Kurrachee, 29 48
Yokohama, 18 462
Rotterdam, 6 38
Brussels, 8 31
Auckland, 4 cs. 41

**Collodion—**
Hong Kong, 3 cs. £43

**Caustic Soda—**
Otago 2 t. 14 c. £22
Mauritius, 5 17 64
Rockhampton, 5 12 39
Terneuzen, 10 12 76
Lyttleton, 5 7 36

**Clarifiants—**
Bordeaux, 37 cks. £89

**Citric Acid—**
Hamburg, 5 c. £45
Antwerp, 9 80
Cologne, 10 83
New York, 1 t. 2 c. 170
Genoa, 17 140

**Cream Tartar—**
Rockhampton. 1 t. 10 c. £196
Halifax, 1 1 134
Auckland, 5 31
Otago, 5 34
Townsville, 3 19
Sydney, 10 10 1,321
Melbourne, 1 142

**Chemical Salts—**
Boston, 17 c. £200

**Copperas—**
Bourgas, 5 t. 5 c. £10

**Cleansing Crystals—**
Boston, 4 t. 10 c. £65

**Carbolic Acid—**
Hamburg, 4 t. 15 c. £290
Rotterdam, 25 cks. 212

**Carbolic Disinfectant—**
Sydney, 9 cs. £32
Brisbane, 20 dms. 18

**Creosote Salts—**
Rotterdam, 464 cks. £225

**Disinfectants—**
Natal, 8 pkgs. £19

**Guano—**
Trinidad, 50 t. £500

**Iodide Potassium—**
Buenos Ayres, 1 cs. £69

**Insect Powder—**
Calcutta, 1 cs. £2

**Iodine—**
Melbourne, 1 cs. £72

**Manure—**
Trinidad, 200 t. £2,200
Dunkirk, 111 333
Jamaica, 20 200
Riga, 145 10 c. 355
Hamburg, 59 14 240
Gothenburg, 197 13 828
Rotterdam, 19 10 95
Harlingen, 19 14 58
Libau, 517 bags. 150
Bordeaux, 245 ,, 180
Havre, 150 ,, 50
Rouen, 100 brls. 250 ,, 200
Treport, 842 ,, 330
St. Nazaire, 10 430 ,, 150

**Nitric Acid—**
Jersey, 24 carboys £65
Hong Kong, 6 cs. 12

**Oxalic Acid—**
Dunkirk, 5 t. £170

**Potassium Cyanide—**
New York, 10 c. £55

**Phosphorus—**
Lisbon, 4 c. £30

**Sulphuric Acid—**
Algoa Bay, 25 cs. £21
Natal, 1 t. 15 c. and 32 cs. 39
Melbourne, 16 dms. 9
Hong Kong, 15 cs. 14

**Soda Ash—**
Buenos Ayres, 28 t. 19 c. £105
Sydney, 25 1 123

**Salts—**
New York, 18 c. £100

**Saltpetre—**
Santos, 14 t. 15 c. £321
Lisbon, 15 316
Hamburg, 2 41
Ghent, 1 19 41
Rotterdam, 10 11
Rockhampton, 10 11
Bahia, 3 14 81
Rio Janeiro, 5 7 120
Seville, 2 1 43
Melbourne, 2 10 54

**Sulphur, Flowers—**
Lisbon, 1,140 brls. £922
Melbourne, 1 t. 5 c. 9

**Sheep Dip—**
Natal, 4 t. 17 c. £207

**Soda Crystals—**
Valparaiso, 3 t. £11
Fremantle, 5 1 c. 14
Newcastle, 27 3 67
Hong Kong, 16 4 37

**Sodium Bicarbonate—**
Sydney, 2 t. 10 c. £15

**Saccharum—**
Sydney, 6 t. 17 c. £156

**Sugar of Lead—**
Sydney, 2 t. 7 c. £60

**Strontia Nitrate—**
New York, 3 t. 13 c. £108

**Sheep Dip, Powder—**
Natal, 100 cs. £280
New York, 13 t. 7 c. 660
Cape Town, 1 10 80

**Tartaric Acid—**
Sydney, 2 t. 10 c. £406
Auckland, 9 77
Otago, 5 44
Melbourne, 1 5 203
Natal, 2 18

## LIVERPOOL.

*Week ending April 25th.*

**Alkali (refined)—**
Carthagena (Spain), 8 tcs.

**Ammonia (Sulphate)—**
Ghent, 50 t. 3 q. £661
Barcelona, 2 1 70

**Aluminous Cake—**
Calcutta, 10 t. 13 c. 2 q. £32

**Alumina (Sulphate)—**
Passages, 5 t. 5 c. £29

**Acetic Acid—**
Lisbon, 8 c. £6
Santos, 11 11

**Alum—**
Valparaiso, 2 t. 16 c. £15

**Alum.**—*Continued.*
Bahia, 1 t. 3 c. £6
Bombay, 21 9 107
Smyrna, 6 30
Alexandria, 3 10 20
Montreal, 9 10 56

**Ammonia (carbonate)**
Montreal 2 t. 2 c. £70
New York 5 9 203
Venice 11 21

**Arseniate Aniline—**
New York 15 t. 2 c. £670

**Acetate of Lime—**
Santos 10 c. £6

**Bleaching Powder—**
Bordeaux, 7 cks.
Boston, 542
Calcutta 235 cs.
Callao 9 brls. 1
Carthagena (Spain), 20 cks.
Chicago, 30 boxes
Genoa, 233 cks.
Ghent, 131
Havre, 10
Malaga, 5
Melbourne, 42 tcs.
New York, 477 159
Odessa, 45
Oporto, 27 cks. 10 brls. 19 tcs.
Portland, Me., 34
Rouen, 29
St. Nazaire, 90
Santander, 17 brls.
Windsor Mills, 85 tcs.

**Borax—**
Constantinople, 10 c. £15
Alexandria, 4 2 q. 7
Valparaiso, 2 3
Ibrail, 9 15
Antwerp, 3 cks. 30
Rotterdam, 3 31
Hamburg, 2 t. 7 c. 70

**Bichrome—**
Antwerp, 1 t. 4 c. £49
Santos, 16 39

**Bluestone—**
Rosario, 2 t. £29

**Bisulphite of Lime—**
Cape Town, 1 t. 9 c. £40
Melbourne, 3 t. 9 c. 28

**Brimstone—**
Boston, 11 t. 2 c. £61
Vera Cruz, 9 t. 9 c. 47

**Boracic Acid—**
Antwerp, 5 brls. £90

**Bisulphite of Soda—**
Sydney, 2 t. 19 c. £26

**Caustic Soda—**
Alexandretta, 49 dms.
Amsterdam, 20
Antwerp, 43
Bahia, 30
Barcelona, 35 cks. 190
Batoum, 400
Bilbao, 62
Boston 540
Bremen, 27
Calcutta, 20 kgs. 110
Carthagena (Spain), 40
Catania, 30
Chicago, 40 bxs.
Galatz, 5
Gothenburg, 175
Genoa, 95
Halifax, 400
Hamburg, 10 brls. 38
Hamilton, 100
Havre, 5 brls.
Leghorn, 20
Lisbon, 20 tcs. 36 kgs. 26
Levis, 35
Monte Video, 50
Messina, 130
Nantes, 35
Naples, 38 kgs.
New York, 465
Odessa, 305
Oporto, 35
Passages, 59
Penang, 60
Pernambuco, 75
Philadelphia, 100 brls. 280
Piræus, 33 brls.
Portland, Me., 34 tcs. 733
Porto Alegre, 20
Quebec, 60
Rio de Janiero, 15
Rotterdam, 23
Rouen, 35

**Caustic Soda**—*Continued.*
Santander, 86 dm
Santiago de Cuba 50
Savanilla, 10
Seville, 10 brls. 75
Singapore, 36
Smyrna 15
Sydney, 29
Toronto, 35
Trieste, 22
Valencia, 39
Valparaiso, 10
Venice, 94
Vera Cruz, 20
Yokohama, 139
Zante, 4

**Calcium Chloride—**
Genoa, 4 t.
Bordeaux, 4

**Copper Sulphate—**
Bordeaux, 4 t. 3 c.
Iquique, 11 8
Rotterdam, 1 2
Gibraltar, 10
Rouen, 17 4
Buenos Ayres, 1 19
Odessa, 1 19
San Sebastian, 1 1

**Chlorate of Potash—**
Oporto, 5 c.
Hamburg, 8
Gothenburg, 10
Rotterdam, 10 t. 10
Buenos Ayres, 2
New York, 10
Montreal, 5
Barcelona, 1

**Chemicals** *(otherwise undes*
Montreal, 7 t. 1 c.
Rotterdam, 1 15
Stockholm, 3 1
Rio de Janeiro, 10
Havre, 102 19
Genoa, 1 10
Marseilles 16 3 q.

**Caustic Potash—**
Baltimore, 9 t. 15 c.

**Copperas—**
Halifax, 16 t. 2 c.
Santos, 4 4
Syra, 6 2

**Carbolic Acid—**
New York, 4 t.
Montreal, 18 c.
Boston, 1 5

**Charcoal—**
Antwerp, 3 t. 15 c.
Hamburg, 35
Rouen, 14 3

**Cream Tartar—**
Curacao, 1 c.
Halifax, 11
Quebec, 11

**Cobalt Oxide—**
New York, 1,000 lbs.

**Disinfectant—**
Port Elizabeth, 1 t.

**Epsom Salts—**
Rio Janeiro, 80 kgs.

**Guano—**
Havana, 98 t. 8 c.
Aviles, 3

**Hydrochloric Acid—**
Valparaiso, 50 bs.

**Manure—**
Barbadoes, 25 t. 9 c.
Antwerp, 12 4

**Manganese (Recoverd)—**
Rouen, 5 t. 2 c.

**Magnesia—**
Philadelphia, 45 cs.
Rio Janeiro, 20
Talcahuano, 4
Valparaiso, 40

**Oxalic Acid—**
Barcelona, 5 t. 13 c.
Lisbon, 6
San Francisco, 3 12

**Oxalate of Potash—**
Lisbon. 6 c.

**Pitch—**
Cette, 948 t.
Muculla, 21 pkgs.
Coquimbo, 20 brls.
Galatz, 25 brls.
Halifax, 50 t.

**hes—**
rp, 1 t. £23
**horus—**
, 2 q. £5
**ium Carbonate—**
, 20 t. 5 c. £405
**ium Bichromate—**
ruz, 1 t. 17 c. £77
**ium Prussiate—**
5 t. 7 c. £275
**n Bicarbonate—**
, 10 kgs.
rp, 49 cks. 100
ona, 70
ne, 960
a, 1,000
a, 60
40
, 300
rg, 25 kgs. 30 brls. 5 tcs.
rne, 20 kgs.
lies, 25
Video, 4
al, 2,550 kgs. 24 cks. 99 tcs.
60 kgs.
stle, N.S.W., 240 kgs.
, 320 kgs.
lam, 40
ancisco, 30 cks.
, 587 kgs.
dam, 20
rp, 430 t.
, 100
Point, 14
45
ne, 556 cs.
a, 50 t.
astle, 9
o, 330
obo, 209
75
burg, 22
tadt, 220
, 126
apolis, 100
e Los, 40
on, 6
kee, 65
Video, 200
stle, N.S.W., 238
rt News., 491
44
50
d, Me., 1,311
, 599
ucto, 150
lam, 304
lle, 298
ancisco, 100
, 701
olm, 54
o, 150
aiso, 55
, 114
, 520
ork, 542
**lsh—**
68 tcs.
dam, 15 brls.
ore, 351 tcs. 515 cks.
, 120 pkgs. 295 cks. 900 bgs.
312 tcs.
y, 12 cks.
Ayres, 150 brls.
14
ntinople, 19 cks.
20
, 37
13
rne, 21 tcs.
al, 82 28 cks.
rt News, 80
ork, 737 621
, 22 50 brls.
7 cks.
10 brls.
buco, 65
lphia, 459 tcs. 110 cks.
d Me., 11 cks.
Janiero, 100 brls.
ancisco, 61 tcs. 800 bgs.
a, 100 brls.
, 410 cks.
**rystals—**
400 kgs. 50 cks.
e, 170 brls.
a, 10
rne, 167 cks.
Video, 120
al, 20
ork, 25
aiso, 10 brls. 30 cks.
ar, 10
, 85
lphia, 50 cks.
, 50 brls.

**Stannate of Soda—**
Bombay, 10 c. £41
Santos, 6 2 q. 17
**Sodium Carbonate—**
Boston, 56 brls.
**Sodium Silicate—**
Seville, 158 brls.
Galatz, 20 cks.
Malaga, 4 brls.
Sydney, 34 cks.
Valencia, 6
**Sulphur—**
Lisbon, 3 t. £16
Halifax, 7 10 c. 40
Lima, 1 10 9
Rouen, 20 6 92
**Stannate of Potash—**
Bombay, 1 t. 12 c. £142
**Sodium Bichromate—**
Antwerp, 15 t. 8 c. £468
**Saltpetre—**
Tampico, 16 c. 2 q. £13
Pernambuco, 5 t. 14 129
Quebec, 18 20
Newport News, 10 4 208
Montreal, 10 11
**Sheep Dip—**
Natal, 145 dms. £23
Port Elizabeth, 1 t. 12 c. 47
**Saltcake—**
Baltimore, 346 t. 9 c. £651
Boston, 10 11
**Sheep Wash—**
Port Madryn, 4 c. £10
**Soap Powder—**
Antwerp, 1 t. £35
Havre, 10 c. 17
**Stannous Chloride—**
Trinidad, 18 c. £35
**Sodium Sulphate—**
Montreal, 8 t. 1 c. £16
Adelaide, 5 9
**Sodium Nitrate—**
St. Johns, Nfld., 10 c. £6
**Sulphocyanide of Alumina—**
Santos, 4 c. £12
**Silicate of Potash—**
Amsterdam, 1 t. 5 c. £10
**Tin Crystals—**
Santos, 2 c. £9
**Tartar Emetic—**
Santos, 6 c. £42
**Tar—**
Addah, 10 brls.
Cienfuegos, 4 ,,
**Verdigris—**
New York, 1 t. 2 c. £52
Montreal, 2 6
**Zinc Chloride—**
Genoa, 9 c. 3 q. £11
Bombay, 1 t. 10 25

## GLASGOW.

*Week ending April 28th.*

**Ammonia Sulphate—**
Mauritius, 123 t. 19 c. £1,305
Antigua, 2 24
Carthagena, 120 5 1,440
Antwerp, 20 238
**Bleaching Powder—**
Melbourne, 11 t. 2 c. £110
Sydney, 10 5 93
Bombay, 1 19 23
**Bichrome—**
Bergen, 3 cks. £48
Christiania, 2 t. 77
Antwerp, 16 13 c. 522
**Benzol—**
Rotterdam, 20 puncheons £235
**Chemicals** *(otherwise undescribed)*
Halifax, 14 c. £42
**Creosote Oil—**
Christiania, 20 brls £7
**Flint, Ground—**
Seville, 280 t. £476
**Leather Waste—**
Rouen, 3 t. 7 c. £30
**Manure—**
Jamaica, 22 t. 14 c. £156
**Naphtha—**
Rouen, £1,350
**Potassium Bichromate—**
Bombay, 2 t. 18 c. £117
Venice, 2 4 90
Rouen, 6 200
**Potassium Carbonate—**
Bombay, 1 t. 15 c. £28
**Pitch—**
Sables D'Olonne, 961 t. £625
Christiania, 87 cks. 52
**Potassium Prussiate—**
Rouen, 10 t. 15 c. £550
**Soda Ash—**
Boston, 4 t. 12 c. £33
**Salt—**
Melbourne, 1 t. 9 c. £20
**Sugar of Lead, Brown—**
Bombay, 2 t. 17 c. £57
**Saltpetre—**
Halifax, 2 t. 5 c. £50
**Sulphuric Acid—**
Rangoon, 15 t. 6 c. £156
**Sodium Bichromate—**
Rotterdam, 27 cks. £311
Rouen, 10 t. 12 c. 348
**Sulphur, Roll—**
Bombay, 8 t. £60
**Tin Crystals—**
Bombay, 15 c. £39

## HULL.

*Week ending April 24th.*

**Alkali—**
Gothenburg, 6 dms.
**Caustic Soda—**
Antwerp, 15 dms.
Reval, 90
Copenhagen, 4
**Chemicals—**
Antwerp, 14 cks.
Amsterdam, 7 cs. 7 pkgs.
Bremen, 26 cks.
Copenhagen, 16 cs. 1 ck.
Christiansund, 3 cks.
Dunkirk, 80
Dantzic, 6 pkgs. 5 cks. 1,538 bgs.
Gothenburg, 14 cs. 7 cks. 45 pkgs.
Hamburg, 12 10 2
Königsberg, 5 2
Reval, 100
Rouen, 57
Rotterdam, 6
**Manure—**
Antwerp, 522 bgs.
Copenhagen, 73 t.
Ghent, 467 bgs.
Rotterdam 472
**Naphtha—**
Bergen, 1 brl.
**Salt—**
Bergen, 1 ck.
**Tar—**
Copenhagen, 10 cks.
Christiania, 5
Ghent, 2 brls.

## TYNE.

*Week ending April 28th.*

**Alkali—**
Odense, 7 t. 7 c.
Gothenburg, 7 18
Antwerp, 23 12
Hamburg, 31 7
Christiania, 5 13
Rotterdam, 1 14
Copenhagen, 8 8
**Aluminous Cake—**
Odense, 6 t. 12 c.
New York, 26
**Alum—**
Rotterdam, 6 c.
**Antimony—**
New York, 60 t.
**Ammonia Sulphate—**
Dunkirk 50 t.
**Bleaching Powder—**
Odense, 32 t. 9 c.
Gothenburg, 7 14
Dunkirk, 5 9
Antwerp, 66
Hamburg, 47 15
Christiania 9 18
Rotterdam, 21 14
New York, 275 7
Copenhagen, 102 7
Riga, 21 4
**Barium Sulphate—**
Passages, 1 t. 4 c.
**Barium Carbonate—**
Hamburg, 137 t. 19 c.
New York, 50
Rouen, 15
**Barium Nitrate—**
Rouen, 2 t. 4 c.
**Barium Chloride—**
Rouen, 4 t. 19 c.
**Caustic Soda—**
Passages, 1 t. 15 c.
Antwerp, 18 18
Boston, 24 19
Batoum, 38 10
Copenhagen, 1 9
**Glycerine—**
Hamburg, 6 t. 15 c.
**Glauber Salts—**
Christiania 5 t. 2 c.
**Manure—**
Bandholm, 48 t. 16 c.
Nykjobing 30 18
Frederikshavn, 14 14
Nakskov, 235 16
Korsor, 15 0
Esbjerg, 10 2
Riga, 217 0
**Magnesia—**
New York, 2 t. 5 c.
**Potassium Chlorate—**
Gothenburg, 2 t. 0 c.
Odessa, 0 15
Antwerp, 1 0
New York, 1 0
Rotterdam, 0 12
Riga, 2 15
**Pitch—**
Gothenburg, 7 t. 15 c.
**Soda—**
Nykjobing, 12 t. 1 c.
Odense, 41 19
Aarhuus. 21 2
Nakskov, 25 12
Svendborg, 25 8
Constantinople, 32 19
Hamburg, 15 8
Esbjerg, 6 13
Malmo, 106 14
Odense, 21 7
Boston, 50
Christiania, 20 1
Rotterdam, 38 14
New York, 345 8
Christiansund, 6 9
Copenhagen, 350 7
Kallundborg, 20 10
Flensburg, 5 7
Cagliari, 1 q.
Gothenburg, 7 13
**Soda Ash—**
Odense, 13 t. 15 c.
Gothenburg, 28 4
Antwerp, 6 3
Boston, 100 3
Hamburg, 5 9
Christiania, 45 12
Rotterdam, 12 5
New York, 300 2
Copenhagen, 12 17
Riga, 8 9
**Sodium Bicarbonate—**
Odense, 1 t. 0 c.
Hamburg, 5 15
Copenhagen, 1 0

## GOOLE.

*Week ending April 19th.*

**Alkali—**
Ghent, 30 dms.
**Benzol—**
Antwerp, 25 cks.
Rotterdam, 96
**Bleaching Powder—**
Ghent, 52 cks.
**Chemicals** *(otherwise undescribed)*
Calais, 10 cks.
Hamburg, 66
Rotterdam, 26
**Coal Products—**
Hamburg, 49 cks.
**Manure—**
Boulogne, 22 bags
Bruges, 843
Calais, 120
Dunkirk, 45
Ghent, 92
Rotterdam, 309
**Pitch—**
Antwerp, 500 t.
Ghent, 100

## GRIMSBY.

*Week ending April 23rd.*

**Chemicals** *(otherwise undescribed)*
Dieppe, 85 cs. 5 cks.
Hamburg, 20 bls. 9
**Coal Products—**
Dieppe, 9 cks. 12 dms.

# PRICES CURRENT.

[THURSDAY, May 3, 188

PREPARED BY HIGGINBOTTOM AND Co., 116, PORTLAND STREET, MANCHESTER.

*The values stated are* F.O.R. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 8 | 9 |
| ,, Glacial | per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 12 | 0 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2¼ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3¼ |
| Picric | ,, | 0 | 1 | 5½ |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (monohydrate) | ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6 |
| Arsenic, white powdered | per ton | 11 | 7 | 6 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, 880=28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1⅝ |
| ,, Carbonate | ,, | 0 | 0 | 3⅜ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 42 | 10 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 11 | 5 | 0 |
| ,, ,, (grey), Hull | ,, | 11 | 0 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8½ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 5 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 11 | 10 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, | per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 3 | 0 |
| ,, 50/90 ,, | ,, | 0 | 2 | 6 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2 |
| ,, (crude 60°) | per gallon | 0 | 3 | 11 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2⅛ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 0 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 80 | 0 | 0 |
| ,, Sulphate | ,, | 21 | 0 | 0 |
| ,, Oxide (copper scales) | ,, | 75 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 2 | 0 | 0 |
| Lead (sheet) for cash | ,, | 15 | 0 | 0 |
| ,, Litharge Flake (ex ship) | ,, | 16 | 5 | 0 |
| ,, Acetate (white, ,, ) | ,, | 25 | 15 | 0 |
| ,, ,, (brown, ,, ) | ,, | 20 | 15 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 10 | 0 |
| ,, Nitrate | ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 8 | 15 | 0 |
| ,, ,, (grey) | ,, | 13 | 5 | 0 |

| | | £ | s. | d |
|---|---|---|---|---|
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 17 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° O.P. | per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent | ,, | 0 | 3 | 10 |
| ,, ,, Miscible, 60° O.P. | ,, | 0 | 5 | 4 |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 3 | 8 |
| Cotton-seed | per ton | 21 | 10 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | |
| Petroleum, Russian | per gallon | 0 | 0 | |
| ,, American | ,, | 0 | 0 | |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | |
| ,, Chlorate | per lb. | 0 | 0 | |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 6 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 0 | |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 7 | |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | |
| ,, Permanganate | ,, | 4 | 5 | |
| ,, Prussiate Yellow | per lb. | 0 | 0 | |
| ,, Sulphate, 90 % | per ton | 10 | 10 | |
| ,, Muriate, 80 % | ,, | 8 | 0 | |
| Silver (metal) | per oz. | 0 | 3 | |
| ,, Nitrate | ,, | 0 | 2 | |
| Sodium (metal) | per lb. | 0 | 6 | |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 17 | |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | |
| ,, ,, (Soda Crystals) | ,, | 2 | 8 | |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | |
| ,, Acetate (ex ship) | ,, | 19 | 10 | |
| ,, Chlorate | per lb. | 0 | 0 | |
| ,, Borate (Borax) | per ton. | 30 | 0 | |
| ,, Bichromate | per lb. | 0 | 0 | |
| ,, Hydrate (77 % Caustic Soda) | per ton | 7 | 15 | |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 7 | |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 15 | |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 15 | |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 12 | |
| ,, Bicarbonate | ,, | 5 | 0 | |
| ,, Hyposulphite | ,, | 5 | 10 | |
| ,, Manganate, 30/33 | ,, | 10 | 0 | |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | |
| ,, Nitrite, 98% | per ton | 28 | 0 | |
| ,, Phosphate | ,, | 16 | 10 | |
| ,, Prussiate | per lb. | 0 | 0 | |
| ,, Silicate (glass) | per ton | 5 | 10 | |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 5 | |
| ,, Sulphate (Salt-cake) | ,, | 1 | 1 | |
| ,, ,, (Glauber's Salts) | ,, | 1 | 10 | |
| ,, Sulphide | ,, | 8 | 15 | |
| ,, Sulphite | ,, | 5 | 2 | |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | |
| Sugar, Beet | per cwt. | 0 | 14 | |
| ,, Cane | ,, | 0 | 16 | |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | |
| ,, Barium | ,, | 0 | 0 | |
| ,, Copper, 60% | ,, | 0 | 0 | |
| Sulphur (Flowers) | per ton | 8 | 15 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 5 | 0 |
| Tallow | ,, | 26 | 0 | 0 |
| Tin (metal) | ,, | 90 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 7 |
| Zinc (Spelter) | per ton | 17 | 15 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 12 | 6 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, May 12, 1888.**


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## Notices.

l communications for the *Chemical Trade Journal* should ddressed, and Cheques and Post Office Orders made able to—

**AVIS & CO., 5, John Dalton Street, MANCHESTER.**

Our Registered Telegraphic Address is—

**"Expert, Manchester."**

he yearly Subscription, commencing at any date, to the *nical Trade Journal*,—payable in advance,—including age to any part of the world, is 10s. 6d. Readers will ge by making their remittances for subscriptions by tal or Post Office Order, crossed. The charge for a tal Order for 10s. 6d. is one penny.

ommunications for the Editor, if intended for insertion he current week's issue, should reach the office not later n **Tuesday morning.**

rticles, reports, and correspondence on all matters of erest to the Chemical and allied industries, home and eign, are solicited. Correspondents should condense their tter as much as possible, write on one side only of the per, and in all cases give their names and addresses, not cessarily for publication. Sketches should be sent on arate sheets.

We cannot undertake to return rejected manuscripts or awings, unless accompanied by a stamped directed velope.

Readers are invited to forward items of intelligence, or ttings from local newspapers, of interest to the trades ncerned.

As it is one of the special features of the *Chemical Trade urnal* to give the earliest information respecting new ocesses, improvements, inventions, etc., bearing upon emical and allied industries, or which may be of interest our readers, the Editor invites particulars of such—when working order—from the originators; and if the subject is med of sufficient importance, an expert will visit and port upon the same in the columns of the *Journal*. There no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in king inquiries of, or opening accounts with advertisers in s paper, will kindly mention the *Chemical Trade Journal* as source of their information.

Advertisements intended for insertion in the current ek's issue, should reach the office by **Wednesday morning** the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or cant, Premises on Sale or To be Let, Miscellaneous Wants, l Specific Articles for Sale by Private Contract, are inser- in the *Chemical Trade Journal* at a charge of One Penny word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory lumns, and all Advertisements not prepaid, are charged at Tariff rates, which will be forwarded on application

## FIAT JUSTITIA.

ON the tenth of November, 1882, was held the first meeting of members of the Society of Chemical Industry resident in the Manchester district, with a view to the formation of a local section. The section was duly formed on the 19th of December, the first committee was elected, the bye-laws passed, and the same duly forwarded to the Council for its approval. So far all was well; the district was one in which a section properly nurtured ought to have developed until it had become the most important in the whole country; the first committee was a fair and representative one, consisting as it did of local men of repute—Sir Henry Roscoe (then plain Dr. Roscoe), Dr. Angus Smith, Dr. Hewitt, T. C. Ansdell, George E. Davis, R. F. Carpenter, C. Estcourt, J. Carter Bell, J. Angell, I. Levinstein, S. Mellor, J. Jones, Dr. Watson, F. B. Benger, Peter Hart—and members were only too anxious to support the committee with papers and their presence at the monthly meetings of the section. How all this has changed, and while the London section is flourishing like the green bay tree the Manchester section languishes so that this month no meeting was held owing to the absence of papers. Still, to keep up ones interest in a moribund concern, the fiasco of the April election of officers should be sufficient to show the members of other sections "How not to do it." Manchester men as a rule have very strong feelings against anything that is not square and above board, and there is no doubt that the present troubles of the section have been caused by the not very straightforward way in which the business has been carried on during the past three or four years. Personal interest has been allowed to grow apace, and the result has been disastrous. We have no hesitation in saying that since the elections to the committee of October, 1883, the proceedings have been characterised by a manifest absence of unselfishness, and by flagrant disregard of the bye-laws of the section made and assented to in general meeting; the bye-laws have even been distorted in reprinting, and even when bye-law No. 4 was amended in general meeting the committee made serious alterations in it ere it reached the members' hands. No doubt much of the evil which has now come upon the section is the result of internal jealousies, and may be is, to some extent, a punishment for the intrigue which caused the retirement of Sir Henry Roscoe from the chairmanship. Several men of position, when they heard of the success of that intrigue, ceased to take any further interest in the section, especially when they heard that one of the means adopted by an interested party was the marshalling of his forces at a preliminary dinner held at the Old Swan Hotel, and afterwards marching them across the town to record their votes in the ballot room. The success which attended these earlier intrigues led interested parties to persevere in their tactics, and as a result the 1886 and 1887 elections furnished the last straw which has broken the camel's back. At the election last month members present at the meeting complained very bitterly of the informal and illegal manner in which the business was conducted, and the chairman having decided against the dissentients, a resolution was adopted instructing the hon. sec. to lay their case before the council of the society. This has been done, and the council has decided that all the elections for the past few years have been illegal and irregular, and have ordered a new election. But here again comes the rub. There does not seem to be one man among the whole committee who knows how to conduct a public meeting. When the validity of the ballot had been questioned the proper course would have been for the chairman to have adjourned the meeting; but instead of this it was carried to its conclusion and dis-

solved. The next annual meeting is in April, 1889. Now rule 46 (*b*) of the council and general society says :—

> (*b*) That, except elections to fill up unforeseen vacancies, all elections to the committee of a local section, and all election of officers of the section, whether such officers be appointed by the committee or otherwise, shall take place in the month of April, and that the names of the persons elected shall in each case be reported to the council on or before the 20th of that month; but that the members of committee and the officers thus elected or appointed in April shall not take office, and those whom they are to succeed shall not retire from office, in each case until the close of the session then current.

So that it is quite evident there is only one way out of the difficulty—there cannot be any valid election by the general body of members. At present there are five vacancies on the committee, viz., those who retired at the last annual meeting. These vacancies are, under the circumstances, decidedly "unforeseen," and can only legally be filled up now by the committee itself. There is no provision either in the bye-laws of the society or in the rules governing the section for a second annual meeting in one year, or for a second ballot to be taken. The objections should have been urged before the ballot really had taken place, and under the circumstances it is just a question whether the instructions issued by the council could be upheld in a court of law,

The new ballot list, which has just been issued, deserves a few words of comment. Without fear of contradiction, we say it is the most amusing public document we have ever seen. It is ballot with a vengeance, for, in the first place, the balloting paper has the member's name and address written across the back of it, and the circular, though dated from The Cliff, Higher Broughton, does not state where the meeting is to be held, or that it has any connection with any society in particular. The circular states that a special general meeting will be held to elect a committee. We argue, however, that a special general meeting is not one for such a purpose, as clearly defined by the bye-laws of the society. For a new election to take place, the bye-laws of the general society will have to be amended or suspended; the former can only be done in annual meeting, the latter by extraordinary meeting. Is the game worth the candle?

## CHEMICAL ENGINEERING.

IN our next number we shall commence to publish the lectures upon this subject delivered at the Manchester Technical School, by the editor of *The Chemical Trade Journal*, Mr. George E. Davis; but before actually launching out into what is certainly an unknown land to many, a few remarks upon the bearings of the whole question may not be out of place, especially as some few manufacturers seem to have gone out of their way to make, in their ignorance, comments upon a subject they did not understand, and to attribute motives to a class of individuals who have always put themselves to a very great deal of personal inconvenience to help and aid them in the conduct of their business.

The remarks that follow have been prompted by the report of a conversation that has reached our ears. Report says that a certain manufacturer, on seeing the before-mentioned lectures advertised, exclaimed—"It is all very fine for Davis after having had the *entrée* of all the chemical works in the country to now go and lecture about them." This little speech shows the absolute ignorance of the speaker upon the subject of chemical engineering. The science of chemical engineering does not consist in hawking about trade secrets—if a chemical engineer were discovered taking the processes and the details of them, from one works to another, his professional reputation would soon come to an end, and therefore it would be the height of absurdity to think that any sound thinking man would endeavour to carry on his business by the aid of such practices. Chemical engineering has higher aims, it endeavours to work out the application of machinery and plant to the utilisation of chemical action on the large scale—in the laboratory and drawing office, so that processes may be made to work at once with certainty and freedom from that expense which is always attendant upon the old-fashioned process of trial and error. Fortunately the number of those who take such a narrow-minded view of things as already expressed, is very small, and it generally, we may say in all cases that have come under our observation, happens that those who make the greatest cry have the least wool to show, and in this case now under consideration, we may say without any fear of being incorrect, that the said manufacturer need not fear of the ex-inspector copying or carrying away any device, or process, or even the idea of any plant or apparatus belonging to him. To this class of manufacturer the inspector is always welcome, so long as he brings information, something that falls from the clouds to him free of cost, but there the relationship ends. By-and-by, when we have sufficient time to prepare our argument, we shall return to this subject again. One or two manufacturers who ought to know better have chosen a very selfish line of argument in connection with this subject, which we hope shortly to thrash out in these columns, and we think we shall be able to show that their alarm was groundless, and their sinister speculations also.

There is no doubt that the English nation is extremely backward in chemical engineering. This has been acknowledged by nearly all manufacturers of repute, and yet what is being done to mend matters? Absolutely nothing. And yet, when anyone comes forward to describe in a long course of lectures of what it actually consists, the most unfair and selfish interpretations are put upon the matter. Fortunately adverse criticisms are very few and far between, and that they are entirely unfounded will be our object to show in the reproduction of the various lectures delivered at the Manchester Technical School, which are, we believe, the first lectures on the subject that have been delivered in the native tongue to the English-speaking race.

The idea in publishing these lectures in *The Chemical Trade Journal* is to prepare them for reprinting in book form subsequently, and the editor would feel much obliged for any criticisms, either for re-arrangement of the subject, for omission of matter, or additions thereto, or for any remarks which the readers of them may feel constrained to make.

# Legal.

## TRADE SECRETS.

WOOD *v.* PLANT.

IN the Chancery Division of the High Court of Justice, on the 20th ult., before Mr. Justice Chitty, Mr. Whitehorne, Q.C., with whom was Mr. Sebastian, moved in the above matter, on behalf of the plaintiff, for an injunction to restrain two defendants, Mr. Alfred Plant and Mr. William Henry Jackson, from making use of or disclosing a valuable trade secret. Notice of motion, said the learned counsel, asked to restrain the defendants, their servants, agents, and workmen, from using or disclosing to any person any invention, or process, or improvement of the manufacture of pottery or ceramic ware, made and discovered by Alfred Plant, as manager of the Crystal Porcelain Pottery Company Limited, Stoke-on-Trent, and to restrain the defendant Plant from publishing, issuing, or selling a pamphlet written by him explaining the manufacture of porcelain tiles. The case was this: The company took Mr. Plant into its service under an agreement which contained a restrictive clause upon which the plaintiff relied. The company had since been wound up,

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and the liquidator of the company sold expressly not only the goodwill of the business the company had been carrying on, but benefit of the restrictive agreement that Mr. Plant had entered into, and the only question the Court would be asked to determine was this—Whether this particular contract was assignable. Mr. Jackson, the other defendant, had paid a sum of money to Mrs. Plant for the pamphlet, which had been previously unsuccessfully offered to other persons for sale. His learned friend, Mr. Church, who represented Mr. Jackson, said that he neither opposed nor sanctioned the injunction which was asked for. His main opponent, therefore, was Mr. Plant (represented by Mr. Elgood). An agreement was entered into in the month of June, 1882, under which Mr. Plant undertook to serve the company for a period of seven years, to give the company the exclusive benefit of all and every process and invention which should be made or discovered by him for the manufacture of porcelain or ceramic ware; that he would disclose such inventions, etc., to persons appointed for the purpose by the Board of Directors, but would not disclose the same to any other person. He further undertook in the event of disclosing the same to pay to the company the sum of £5,000. The company went into voluntary liquidation in March, 1886, and that was followed by a Supervision Order, pronounced by his lordship the same month. The effect of the contract which was entered into was to make secrecy with regard to those trade secrets a part of the goodwill of the company's business.

Mr. Elgood contended that the agreement was not on the face of it assignable, and was only intended to endure so long as the company continued to carry on its business. He further argued that it could not be enforced, because it was in restraint of trade.

Mr. Justice Chitty: Without calling on counsel to reply, it appears to me this is a question which is scarcely arguable at present in regard to this agreement. The circumstances are these: The defendant, Mr. Plant, agrees to become the manager of a company which is carrying on a business which is well indicated by its title of "The Crystal Porcelain Pottery Company Limited." Now, in that agreement there is contained a stipulation which is to this effect: "Alfred Plant will give to the company the exclusive benefit of all and every the inventions and processes which have been, or shall from time to time be made or discovered by him for the manufacture of, or in any wise relating to, pottery and ceramic ware, and all improvements which he may make therein respectively, and if the same or any of them be patented will assign every such patent to the company, and will, as and when required, disclose to such person or persons as the Board of Directors may from time to time nominate all such inventions, processes, and improvements, in the fullest and clearest manner, so that the same may be used freely and easily by the company and its employés." Now, that stipulation is unqualified, and it is perfectly clear, on the face of it, Mr. Alfred Plant gives the exclusive benefit of all these inventions and discoveries of his, whether patented or not, and he is from time to time to make full disclosure to the company's officers, so that the company may have the fullest benefit of all such inventions, processes, and improvements. That is done by way of agreement, but there is an assignment to the company of the inventions whether patented or not. Then there comes a clause which would have to be modified in regard to the patent, because the patent must on the face of it, that is to say, on the specification, disclose any parts of it, which parts, if the patent had been maintained, would have been a secret invention. The clause I am about to read must, of course, be modified with reference to patents, because otherwise no patent could be obtained, that is, it must be modified with reference to the patent obtained; but here there is no patent. Therefore, although I make the observation, it has no special bearing upon the case now before me. Now comes the agreement which the assign of the company seeks to enforce: "and Alfred Plant will also abstain for ever hereafter." Now those words are express, and I cannot import into this agreement, as Mr. Elgood asks me to do, some agreement to the effect that it is only to operate during the continuance of the service. It is plain on the face of it that the parties clearly contracted that this abstention from disclosing should be perpetual; that is to say, of course, during the life of the man who could disclose it. "Alfred Plant will also abstain for ever hereafter from disclosing the same to any other person or Corporation." Then come in these words, "without the consent of the company, testified by a resolution of its Board of Directors," and upon that it is said that, without intervention, if the company is being wound up, the consent will no longer be obtained. Therefore, I am to give some different meaning to this clause, and to limit also the period of time during which the stipulation is to operate until the time when the company itself is carrying on business. I think that argument cannot be maintained. There would be no breach upon which any action could be taken if the assign of the company were to give his consent. The clause must be read as it stands; but at the same time, if the consent were once given by the person beneficially entitled to the benefit of the consideration here there would be no actual fraud. Therefore, I am not bound to change the term "for ever hereafter" to some limited period of time simply by reason of there being a stipulation as to the consent of the company. Now, that such agreements as these are assignable is clear. The purpose of this agreement is to support and protect the business of the company, and they are, upon the face of the agreement the purchasers, through the medium of the stipulation I have read, of the invention (I use that short term) of Mr. Plant. Mr. Plant therefore, has, for valuable consideration, assigned those benefits to them. Then the case is equivalent to a covenant for protecting the goodwill of the business. Covenants of that kind are quite clearly assignable. I mentioned, during the course of the argument, one line of cases about which I think no doubt could possibly be maintained. For instance, a man enters into the service of a person carrying on a milk business; and he (the servant) agrees to serve his master during a certain time, subject to the ordinary stipulation as to his being dismissed, and the like. It is constantly the case that, in those agreements, there is a provision inserted which is to operate after the determination of the service. Where the provision is reasonable, as for instance that the man shall not carry on business within a mile of the old place of business of his former employer, or that he shall not be engaged in a particular business for a certain period of time, which is considered to be a reasonable period, such agreements are constantly enforced. This stipulation comes within the principle, and I hold that, notwithstanding the word "assigns" does not occur in the agreement the benefit of the agreement, is assignable, because goodwill is property, and this is in support of the goodwill of the business, consequently the stipulation is assignable with the goodwill of the business, and therefore, I hold that the purchaser of the business, who is the plaintiff, is entitled to sue. It is quiet unnecessary to go into any of the cases with regard to the insertion or non-insertion of the word "assign." Buckland *v.* Pilban is one and Churchill *v.* Brown is another, and there are other cases, to which I need not refer, to the same effect. I hold, therefore, that the plaintiff here is entitled to the injunction which he asks for.

Mr. Whitehorne: My lord, I would suggest to my learned friend, Mr. Elgood, with your lordship's permission, whether he will make an end of this matter now, at once.

Mr. Justice Chitty: If he likes to do so, of course he may.

Mr. Elgood: I do not know that I am prepared at the present moment to say. I cannot consent to it now.

Mr. Whitehorne: If my learned friend will not do so, I cannot make him, of course; but I make him the offer.

Mr. Elgood: There will be the usual undertaking, if we afterwards agree, to make an end of it.

Mr. Justice Chitty: Mr. Whitehorn you may draw up the order as for a perpetual injunction. There can be no objection to the terms of it.

Mr. Elgood: No, I think not, my lord.

Mr. Whitehorne: It will be a perpetual injunction until further order, and my lord, I presume the injunction will be against both the defendants according to the terms of the notice of motion.

Mr. Justice Chitty: Yes, exactly, according to the terms of the notice of motion that will be so.

Mr. Whitehorne: If your lordship pleases—against both the defendants.

Mr. Justice Chitty: Yes, I think so.

# Queries and Replies.

BLACK VARNISH.—What would be the specific quantity of naphtha to mix with tar to make black varnish?—J. W.

WASTE PRODUCTS.—What is the best and most profitable means of utilising the waste products produced in the manufacture of $CS_2$ and $S Cl_2$, and cost of plant for so doing?—C. J. S.

Natural Gas. — The following books may interest B. J. H. :—Ashburner: Geologic Distribution of Natural Gas; also, The Geology of Natural Gas, by the same author; Bannister: Something about Natural Gas; Orton: Petroleum and Inflammable Gas; Weeks: Natural Gas in the United States. Any of these may be obtained by writing to the publisher of the *American Manufacturer*, Pittsburgh, Pa., U.S.A.—Driller.

Mensuration.—Boat-pans may, without sensible error, be taken as of triangular section, and cones as segments of spheres. For "boat-pans," multiply the base by half the height of the perpendicular, and then by the length of the pan. If the measurement is made in feet, the answer will be in cubic feet. For "cones," add the square of the depth to three times the square of the radius of the base, multiply the sum by the depth and by 0·5236, and the product is the solid contents.—Engineer.

Manganese.—Is there a trade demand for 90 to 95 per cent. manganese ore?—Trent.

Molybdenum.—Is there a trade demand for an ore of this metal?—Trent.

Qualitative Analysis—Where can I find tables for qualitative analysis, showing all the rare metals in their places?—Trent.

Ultramarine.—Is there any published description of the manufacture of ultramarine?—F.

# Parliamentary Jottings.

INVOICES FOR THE UNITED STATES.

Mr. O. V. Morgan asked the Under-Secretary of State for Foreign Affairs whether he was aware that it was the custom of the United States Consuls in this country when certifying an invoice of a shipment to the United States to make a charge of 10s. 6d. as fee and a charge of 2s. 6d. for declaration; and whether that charge of 2s. 6d. was also levied on German shippers to the United States; and, if not so levied, why were English shippers put at a disadvantage?—Sir J. Fergusson: There is no information in the possession of the Foreign Office to the effect that any different charge is made by United States Consuls in this country to British and to German shippers, and the Board of Trade, of whom I have made inquiry, are equally unaware of such a practice. If any specific instance of such differential charges can be brought to the notice of the Secretary of State inquiries will be made and, if possible, redress procured.

THE BURMAH RUBY MINES.

Sir R. Lethbridge asked the Under-Secretary for India whether the Government of India, in a telegram to the Secretary of State of June 5, 1887, relating to the lease of the Burmah Ruby Mines to Mr. Streeter, stated: "We see no just ground for cancelling this arrangement;" and whether the Government of India had subsequently discovered any just ground for cancelling the arrangement referred to, and, if not, whether Her Majesty's Government would sanction the arrangement.—Sir J. Gorst: The words are correctly quoted. If the hon. member will look at page 31 of the papers he will see that the Government of India reported that no binding agreement had been entered into, and at page 32 he will see that the Secretary of State maintained his original position of refusing to sanction any lease of the mines until full information respecting their value and respecting native rights had been received.—Sir R. Lethbridge asked whether the House was to understand that Her Majesty's Government would sanction the arrangement if they found on further inquiry that it was a just one.—Sir J. Gorst said he had frequently informed the House that the Secretary of State for India had sent an expert to the Burmah Ruby Mines. That expert had visited the mines, and had made, or was on the point of making, a report to the Government of India, and the Secretary of State had every confidence that the Viceroy and the Council would do full justice to the revenues of India, and to the parties concerned, when they had a full and complete report before them.—Mr. Henniker Heaton asked when the correspondence on the subject would be published.—Sir J. Gorst said the correspondence must be kept back for the report of the expert referred to.

THE MINES ACT.

Mr. Abraham (Glamorganshire) asked the Home Secretary whether his attention had been called to the dispute and consequent strike in connection with one of the large collieries in the Rhondda Valley in consequence of the employers refusing to supply them with suitable timber without a reduction of wages to meet the expenses thereof; and whether such conduct was in accordance with the provisions of the Mines Act.—Mr. Matthews: I cannot give any authoritative opinion on the effect of the statute, but as I read the Act the owner is bound not to allow the timbering of working places to be done by the workmen unless timber is provided at the places named in the Act, but the Act leaves the owners and workmen free to settle by agreement between themselves on what terms as to wages and otherwise the timber shall be conveyed to those places.

MAT-MAKING.

Mr. Craig Sellar (for Mr. Quilter) asked the Secretary of State for the Home Department what was the daily average of prisoners employed in mat-making for the year ending March 31, 1888.—Mr. Stuart-Wortley: The returns are not yet complete enough to enable me to give my hon. friend the exact figure. I expect, however, that it will turn out to have been somewhere about 1,550.

GOLD IN WALES.

In answer to Mr. T. E. Ellis, Mr. Jackson said: No money has been spent by the Commissioners of Woods in the discovery and working of gold in Wales.—Mr. Howell (for Mr. Watt) asked the First Lord of the Treasury whether he was now prepared to state what steps the Government proposed to take with reference to the recent discoveries of gold in Wales, so as to encourage the development of a new industry, and at the same time create what might become a considerable source of revenue to the nation.—Mr. W. H. Smith: The question is under the consideration of the Government, and they will do everything in their power to develop an industry of this kind.—Mr. Howell asked whether the action of the Executive in these matters was not regulated by statute.—Mr. W. H. Smith said he could not answer that question without notice.—Mr. T. E. Ellis asked whether the right hon. gentleman would appoint a committee to inquire into the matter.—Mr. W. H. Smith said the Government would take all the steps in the matter that might appear to them to be necessary.

## THE PRESENT STATE OF THE LAW CONCERNING THE POLLUTION OF AIR AND WATER.

BY ALFRED E. FLETCHER, F.C.S., F.I.C.,
H.M. Chief Inspector under the Alkali, etc., Works Regulation Act.

The Act of 1853 was followed by another in 1856, which repealed the saving clauses in the former Act in favour of potteries and glass works. It also extended the scope of the Act to all steamboats plying west of the Nore, and to the furnaces of public baths and washhouses.

It seems clear that the Smoke Abatement Act is more operative in the metropolis than elsewhere, because it is there administered by an authority independent of the locality. Doubtless also the success which has attended the working of the Alkali Act has, in part, arisen from the fact that the inspectors under it have been dependent on a central authority and not on a local one.

In all there have been fourteen Acts of Parliament in which the emission of black smoke is prohibited. Nine of these are for England and Ireland, and five for Scotland. They are—

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|---|---|---|
| 1845 | 8 & 9 Vict., c. 20, | s. 114 |
| 1845 | 8 & 9 Vict., c. 33, | s. 107 |
| 1847 | 10 & 11 Vict., c. 34, | s. 108 |
| 1852 | 16 & 17 Vict., c. 128, | ss. 2–6 |
| 1856 | 19 & 20 Vict., c. 107, | s. 1 |
| 1866 | 29 & 30 Vict., c. 90, | s. 19 |
| 1868 | 31 & 32 Vict., c. 119, | s. 19 |
| 1875 | 38 & 39 Vict., c. 55, | s. 91 |
| 1878 | 41 & 42 Vict., c. 52, | s. 107 |

ACTS FOR SCOTLAND.

| | |
|---|---|
| 1857 | 20 & 21 Vict., c. 73 |
| 1861 | 24 & 25 Vict., c. 17 |
| 1865 | 28 & 29 Vict., c. 102 |
| 1867 | 30 & 31 Vict., c. 101 |

It cannot be doubted that further advance in the direction of smoke abatement awaits the impulse of public opinion. In almost every case the emission of black smoke from furnaces may be much diminished, or entirely suppressed, and if the administration of the law were placed in the hands

of officers independent of the local influence, a rapid change for the better would be speedily brought about.

I have not now time to describe the many appliances that have been found successful in preventing the emission of black smoke, but I will briefly refer to two prospects opening to us whereby the combustion of coal will, at a future day, be carried on in such a manner as to preclude the possibility of causing smoke. I refer to Mr. Mond's new gas producer, and to Mr. Hargreaves's new thermo-motor. In the case of the gas producer, all the coal is transformed into a gas consisting chiefly of hydrogen and carbonic oxide, a mixture incapable of depositing soot. In producing the gas, a much larger quantity of ammonia is collected than has formerly been done, making the conversion into gas an economical process. The great convenience which attends the use of gaseous fuel, together with the gain in ammonia, will probably cause an extended application of this arrangement, and will so far remove all possibility of black smoke being produced.

The second avenue of hope is opened by Mr. Hargreaves's thermo-motor. Here the steam boiler is done away with, and the combustion is carried on by the admission of small quantities of fuel at a time into the furnace under pressure, in such fashion that the combustion is too perfect to admit of the formation of smoke. The duty obtained from the fuel in this motor is three times that of the best steam engines, and bids fair to supersede them.

Although it is pleasant to see hope looming in the distance from these two sources, yet it is to be hoped that we shall not have to wait for their full development before black smoke is suppressed by a more vigorous administration of the law in favour of light and pure air.

Hitherto I have spoken only of smoke from factory chimneys, but in London and other large residential centres we suffer mainly from that of the domestic hearth. There are great difficulties in the way of removing this source of smoke, but much may be done to diminish it. Of this I speak from personal experience, having so arranged the heating arrangements of my house that I contribute no smoke whatever to the air of the town, and but a tenth part of the sulphurous acid gas which my neighours send forth.

It is unnecessary here to describe my method, as I have done recently in a paper read to the National Smoke Abatement Association. I may, however, say shortly that the system I have found satisfactory consists in placing a hot-air stove, heated by coke or anthracite, in the basement of the house, and by its means sending a liberal stream of warm air day and night into the hall, or, if preferred, into the several apartments. This warms the house throughout so thoroughly that it has the effect of a change of climate upon the inmates; it is like a change from January to May. The large and constant open fires become unnecessary, and small gas fires may take their place, being required more for the sake of appearance than for heat. The cooking and water-heating are done by gas. The system is strongly to be recommended on the score of comfort, health, and economy. Less dust is found in the house, and no smoke is discharged outside.

### POLLUTION OF WATER.

Very much that has been said with regard to the pollution of the air applies also to the pollution of water. That water must be largely used in many manufacturing processes is evident, for instance dyeworks, paper works, printworks, chemical works, and the like. The required water is drawn from the neighbouring stream and returned to it again. The public are right in demanding that it shall be so returned in as pure a condition as is practicable, in short, to borrow the words of the Alkali Act, they demand that the "best practicable and reasonably available means" shall be used for rendering the effluent liquor from their works pure and harmless.

In order to enforce this, the Rivers' Pollution Prevention Act, 1876, was framed. The Act remains very much in abeyance for the same reason that the Smoke Acts have been so inoperative, namely, that it also is left in the hands of the local sanitary authorities. No inspector is appointed to enforce the Act, though, strangely, an inspector is called in to stop the working of the Act. Under Clause 12 an inspector is empowered to give a user of water a certificate to the effect that he has used the "best and only practicable and available means" for rendering harmless the liquors he is allowing to flow into the river. A certificate hard to give at any time, but, strange to say, after having given it the inspector has no power to enforce the continued carrying out of the "best and only practicable" means for the use of which he has certified. Yet the certificate holds good for two years, and may be produced in any court as evidence for the manufacturer. If this clause were repealed, and inspectors were appointed to enforce the Act, as in the case of the Alkali Act, there is little doubt that in time our rivers would resume much of their ancient beauty, and we should hear of the saving effected in utilising materials formerly allowed to flow into the stream. Before long the inspectors would be received by the manufacturers as their friends and helpers, as is now the case with the inspectors under the Alkali Act. They would feel indebted to them for their careful watch on the effluent waters of their factories, thus saving much of the loss to which they had been previously subject.

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### DISCUSSION.

Mr. Robert Manuel said, in the earlier part of the paper reference was made to the Common Law aspect of the case, but he rather thought that the lecturer was not quite accurate in the inference which he drew. Mr. Fletcher said there was a legal maxim, *Ubi jus ibi remedium*, which freely translated, meant, where is a right there is a remedy, but he (Mr. Manuel) thought that was a popular though not a scientific view; it should be translated—where there is a legal right there is a legal remedy. Another well-known legal maxim, which was pertinent to the consideration of this subject, was, *sic utere tuo ut alieno ne lædas*, which translated meant—so use your own as not to injure that of others. Now, he would deal with the hypothetical case of the farmer who went to a group of alkali manufacturers and complained that his crops had been injured, but he could not identify the individual who had injured them. There was a case recently decided in the Chancery Division, which related to a riparian interest, and was on all fours with the hypothetical case put by Mr. Fletcher. In that case a riparian occupier was injured by some proceedings of other riparian owners higher up the stream; he brought an action against them, asking for an injunction to restrain the pollution of the stream, and the defence of the particular manufacturers was, that they might infinitesimally injure the stream, but it was a group of manufacturers doing that, and that, therefore, they were not responsible. Notwithstanding that defence, the Court decided against them, holding that, though the damage might be infinitesimal, still they were liable.

Mr. C. G. Cresswell recollected, about ten years ago, when at Runcorn, a case, which probably Mr. Fletcher had in his mind, viz., the action brought by Sir Richard Brooke against Messrs. Wigg Bros. and Steele, for destroying his park. It was true that Messrs. Wigg's were the nearest works to Sir Richard Brooke's property, but having regard to the relative position of Widnes generally, and Sir Richard Brooke's property, it was the opinion of the world in general, and certainly of the manufacturers, that Wigg Bros. were hardly dealt with. They were cast in heavy damages, and at the same time the feeling was that the other Widnes works were equally to blame. As regarded the question of condensation of hydrochloric acid, there was no doubt the enormously increased value of that acid had added a stimulus to all manufacturers to save it so far as possible. Hydrochloric acid was now the main object of the Leblanc process. In 1881, the late Mr. Weldon read a paper describing the change which was in progress, and this change had since taken place. It was a most ominous matter, for unless the price of chlorine kept up, the manufacture of soda by the Leblanc process would very probably come to an end in due course. He thought glass works ought to be included in the operation of the Act, as they used a large quantity of sulphate of soda, not carbonate of soda as in olden times. In the furnaces all sulphate was decomposed into sulphide, and re-decomposed by the silica present. Considering that the operations were carried on on the largest possible scale, the injury done by glass works was very great. He thought other manufacturers would prefer the Act being somewhat extended, because every man who was inspected must feel it hard that there were other men who had done as much damage as he did, who were not reached in any way. As regarded coal smoke, he was discussing the point as to its prevention the other day, with two or three manufacturers in London, men who were sufficiently eminent to make them perfectly impartial in the matter. One of these gentlemen reminded him of a curious thing which he had noticed, viz., that sulphurous acid gas on being liberated, and coming into contact with moist air, precipitated it in the form of fog. Combustion of coal, however perfect, would therefore still cause London fog, though it might not be of quite so deep a

tint as at present. One objection to the black fogs of London was the oily matter associated with them, which coated over each globule of vapour, and rendered them more difficult to disperse. With regard to the pollution of water there were two points. The adoption of the new processes for the recovery of sulphur from alkali waste, however operative they might be, would not get rid of the present heaps of alkali waste, from which there was a large quantity of drainage, and must be for years. When he was at Oldbury, at the works of Mr. Chance, they adopted a process for treating this drainage invented by M. Pechiney, of Salindres. The drainage from the alkali heaps was collected in a large vessel, and oxidised by means of a Körting's blower until a test showed that sulphuretted hydrogen was not given off on addition of acid. When it was sufficiently oxidised, the acid was added, and the whole of the sulphur present in the liquor was thrown down in the shape of commercial sulphur. That struck him as a means which might be generally adopted in alkali works. Another new machine which had lately come under his notice, dealt with other classes of pollution, notably those from paper works. Many excellent evaporators had been invented, but there was an American invention, known as the "Yaryan," which acted by means of a progressive vacuum in a series of vessels. The vessel in which there was the least vacuum was heated to a high temperature, and that with the greater vacuum was heated at a low temperature, and it was claimed that the cost of evaporation was vastly less than by any other process.

Mr. Albert E. Reed remarked that English manufacturers had to compete with foreign manufacturers, who were largely aided by their Governments, and he thought that manufacturers should be told by inspectors what would be the best practical methods for the prevention of pollution. Inspectors told manufacturers that they were polluting air and water, and were not using the best practical methods for preventing this, but they did not tell them what were the best methods. He considered that the administration of the Acts should be entrusted to responsible gentlemen who understood what should be done, in the same way as was done with alkali works, so that all manufacturers might stand on the same footing. With reference to the Yaryan evaporator, he considered that great results would accrue from the use of that apparatus. But supposing a manufacturer had expended several thousand pounds in putting up an evaporator, and some improved method was invented, it was rather hard that he should be called upon to throw away the money he had already spent.

Mr. Fletcher said, with regard to the legal aspects of the question, he thought Mr. Manuel had taken an instance which was not exactly parallel with the one at issue. In the case of the farmer, he found his crops injured by one or all of a group of works; the injury was done at night, when no trace was left, so that he had no means of finding out the aggressor; but in the case of fouling a stream, the person aggrieved could act as his own inspector and trace out the source of injury. It had been suggested that a person might sue when there was an infinitesimal contribution to a general nuisance, and this might be correct in theory, but it could not be carried out in London, where everyone contributed to the nuisance. Of course this was an exaggerated case, but it was an instance of how helpless were the inspectors. He had attempted to show in his paper why inspectors were necessary, and it was in this belief the Act was passed, and they were appointed. With regard to river pollution, there was no doubt that paper works sent a large quantity of weak liquor into the river which commercially was useless, but if an economical way of evaporating it could be devised, the impurity of the rivers would be a thing of the past. The Yaryan process was an economical one. Mr. Reed objected that the best practical method would be hurtful sometimes, as it would not be economical but the "best" included the most economical. To oblige a man to put his works under a glass case in order to avoid polluting the atmosphere would be a theoretical way of preventing it, but it would not be the best, because it would be an impossible way. To attempt too great a refinement would be to fail altogether. The word "best" carried with it all conditions which had to be observed. It was no use advising a process which was not economical, as it could not be carried out.

Mr. W. Smartt said, that having been on a sanitary committee, he had watched the working of the Act of 1875, and from what he had seen lately he came to the conclusion that the management of local authorities was not efficient; and he considered that surveyors who were employed by the local authorities ought, if possible, to receive some kind of training at a central authority.

The Chairman said they had had a most interesting paper, for which they were much indebted to Mr. Fletcher, and they were specially indebted to men like him, who gave a conscientious and enlightened account of their official labours. All those who had looked into the way in which the legislation with regard to alkali and kindred works was carried out, must agree that there was no better illustration of the benefits resulting from the application of science in its bearings upon the welfare of communities and the advancement of industries, than that afforded by the administration of the Alkali Acts. The first Act was necessarily tentative in its character. It was important to make a beginning in the direction of endeavouring to exercise control over emanations that were allowed to pass into the air from chemical works. A very small amount of good was expected to be effected in the first instance, but with the rudimentary Act of 1863 important work was already done, and this was primarily due to the sagacious, prudent, and judicious manner in which it was administered by those to whom the work was entrusted. No better man could have been selected as the first chief inspector of alkali works than Dr. Angus Smith, and no better first lieutenant than Mr. Fletcher. Dr. Angus Smith combined with great sagacity, scientific knowledge, and power of applying that knowledge to practical purposes, great amiability of character and tact; he saw the difficult position in which he and his colleagues were placed in endeavouring to administer a new description of what appeared to be inquisitorial legislation, and he set to work in the first instance to make friends with those who thought him their enemy. Those who knew the results achieved by Dr. Angus Smith and his colleagues during the first years of the working of the Act of 1863, could bear testimony to the success which attended their efforts to enlist the interest of chemical manufacturers in the working of the Act. Mr. Fletcher had pointed out how in the first instance the inspectors were regarded with a jealous eye, but afterwards it was found that, although they might not be technical chemists, they could materially assist manufacturers in exercising control over their works; not by prying into the special knowledge of each individual manufacturer, but by studying broadly the processes which they were to supervise; they were able here and there to suggest improvements in, or methods for, dealing with escapes of noxious vapours, which otherwise might have been allowed to continue in their original condition for an indefinite time. When the Royal Commission of 1868 came to investigate what had been done, they felt it was obvious that much more ought to be accomplished, and, as a result, the Acts of 1874 and 1881 were passed. These Acts included other works, and the important addition to legislation was made of compelling or bringing manufacturers to use the best known means of working, with a special view of preventing the escape of noxious emanations. Having been a member of that Royal Commission, he was struck by the manner in which the inspectors had done their duty. Cases were discovered where it at first appeared as though prosecutions might, with advantage, have been undertaken, but on closer examination the Royal Commission gave Dr. Angus Smith and his colleagues full credit for the prudence with which they had proceeded in endeavouring rather to lead manufacturers to see their faults, and to adopt, by advice and expostulation, better processes, then by applying the vigorous hand of the law, and thus bringing opposition to bear upon the Act, which they could very easily have done, whereby improvement would have been greatly retarded. With regard to river pollution and smoke-abatement, and whether the law might not be better administered, he would not touch upon these subjects further than to say that if the law could be as judiciously administered as it was in the case of alkali and other chemical works, they might expect more beneficial results than had been attained up to the present time. In conclusion, he begged to propose a hearty vote of thanks to Mr. Fletcher for his interesting paper.

The resolution was passed unanimously, and the meeting adjourned.—*J. Soc. Arts.*

## DENATURED SPIRIT.

WE have received from a reliable source the following contribution towards the question of denaturing:—

The most contradictory opinions are now current among the public generally with regard to the new denatured spirit.

£16,430. 11s. 3d. is the three-quarters. Those consenting to the resolution, however, represented only £16,276, which was £154 short of the amount required. He asked if any other wished to sign in favour of the 5s. composition, and, as there was no answer, he declared the composition lost.

After this, Mr. Pearce (of the firm of Johnson, Clapham and Morris, creditors for £800) wished to sign in favour of the 5s. composition, but the chairman would not allow this, as he had declared the composition lost. The appeal of Mr. Sparrow, on behalf of Mr. Pearce, was against this decision.

Mr. Pearce was not present, but a copy of his affidavit was handed to his honour.

Mr. Sparrow cited to his honour a number of cases, decided under the Act of 1869, which, he asserted, were analogous to the case under consideration, where the justices had held that when the meeting was not finally dissolved, it was quite admissible to have the final signature. He said a case had been decided by the Lord Chief Justice that until a resolution for adjudication was passed a creditor might change his mind as Mr. Pearce had done, and sign as long as the meeting existed as a meeting. There was no finality about the matter. In the case of Lancaster, the Lord Chief Justice said the matter was not finished until there had been a dissolution of the meeting, or a resolution for adjudication had been passed, and the meeting on the 17th April had, as a meeting, passed no resolution. There was nothing in the Act to show how the votes should be taken, nothing to entitle the chairman to say the votes were such a way and such a way. There ought to be some machinery for voting, and what he would suggest was that signing should be the method of voting.

Without calling on the opposing counsel his honour confirmed the Official Receiver's decision. He said he had no doubt about the matter at all. The statement of the Official Receiver showed that the matter was concluded, and the resolution was not carried, and that put an end to the matter, and he ruled that Mr. Pearce be not allowed to attach his signature.

Mr. Mulholland applied for the Official Receiver's costs.

Mr. Carver also applied for his own costs.

Mr. Collins said he appeared for a large number of assenting creditors, and he did not ask for his costs. He had no objection to the costs coming out of the estate.

His Honour said he would allow no costs but the Official Receiver's costs, which, in the case of adjudication, would come out of the estate.

ADJOURNED CREDITORS' MEETING.

The adjourned meeting of the creditors was held at the Official Receiver's Rooms, Victoria-street, Liverpool, on the 3rd inst. Mr. Gittens (the official receiver) presided, and the following creditors were also present or represented:—Mr. C. Collins, solicitor (executor of the late Mr. W. L. Evans); Mr. Hawkins, solicitor, and Mr. George Gamble (Messrs. J. C. Gamble and Son); Mr. Dickinson (Messrs. Pilkington Brothers); Mr. H. Swift (St. Helens Collieries Company); Mr. Thomas Speakman, Mr. Laithwaite, Mr. Soulby (Messrs. Watkins and Soulby); Mr. Brocklehurst (Buxton Lime Company); Mr. William Newsome (Messrs. Johnson, Clapham and Morris); Mr. Francis Dickson, Mr. Thompson (Messrs. Thompson and Crippen); Mr. Thomas Brewis (St. Helens Corporation); Mr. Michell (Messrs. Holman, Michell and Co.); the Lancashire Alkali and Sulphur Company; Mr. Morris (Mr. George Rankin); Mr. Scrymgeour (Messrs. Guthrie and Scrymgeour); Mr. Melling, Mr. Samel Kidd, Mr. H. S. Oppenheim (Messrs. Oppenheim and Malkin); Mr. Richard White, Messrs. J. Varley and Co., Messrs. Foster and Goodwin, Mr. J. C. Dobell, Messrs. E. Burrows and Sons, and Mr. J. Warren.

The Chairman read out the names of the creditors present, and Messrs. J. C. Gamble and Son being called, a number of creditors demanded to see the proxy.

Mr. Hawkins, representing the firm, said he had a proxy for the first meeting, but

The Chairman ruled that Mr. Hawkins could not be allowed to vote at that meeting on the proxy for the first meeting. He said that meeting was adjourned for the purpose of bringing a point of law before the court as to whether a vote could be admitted after a resolution had been carried or lost; and the point had been brought before the court on the previous day upon a motion by Messrs. Oppenheim and Malkin. They were represented by counsel, and the point was argued, and the judge confirmed his (the chairman's) ruling that a vote could not be admitted after the resolution had been either carried or lost. They were there to go on with the next business.

A Creditor: What is the next business?

The Chairman: The next business is to adjudicate the debtors bankrupt and appoint a trustee. Will some gentleman propose that William Lockwood and John Leith be adjudicated bankrupt, and the Official Receiver attend at court to make adjudication?

A Creditor moved the proposition, and Mr. C. Cross, a creditor, who had just entered the room, proposed that the firm be not made bankrupt, if that could be avoided.

The Chairman: I don't see how that is possible.

Mr. Cross: If there is any way, we should try to do so. Is there any necessity for their being made bankrupt?

Another Creditor: It is the feeling of two-thirds of the creditors.

A Voice: It is the feeling of two-fifths of the creditors.

Mr. Cross: It is cruel to make gentlemen bankrupt without any fault of their own. Can they make another offer.

The Chairman: They can make another offer to the trustee.

Mr. Collins: But they must be first adjudicated bankrupt.

The Chairman: Yes.

Mr. Oppenheim: I think there is no way out of it now; we have done all we could.

The Chairman: Is there any objection to this? If not, I will declare it carried.

Several Creditors: Decided objections.

The Chairman: Mr. Oppenheim is here to give you his advice. He is acting for the debtors, and if he does not see any way out of it, how can you see any way out of it. I do not see any way out of it. You would separate here to-day leaving the estate with all the expense upon it, and I should have to go to the court and apply for adjudication.

Mr. Oppenheim: It only shows the cruelty of the opposing creditors.

The Chairman then declared the resolution carried.

APPOINTMENT OF TRUSTEE.

The Chairman said the next business was the appointment of a trustee.

An altercation now took place at the bottom of the room between Mr. Morris and Mr. Thompson (Messrs. Thompson and Crippen), the origin of which could not be clearly understood. Mr. Thompson complained that Mr. Morris made use of a personal remark, and the Chairman said Mr. Morris must not make any personal remarks, or he would have to go out of the room. He must conduct himself in a business-like way, and not indulge in any personal manner.

Mr. Oppenheim said it was a general feeling that Mr. George Nicholson (Messrs. Harmood, Banner, and Co.) should be appointed trustee.

The Chairman: What about remuneration?

It was decided to consider that later on.

The motion was carried unanimously.

THE COMMITTEE OF INSPECTION.

The Chairman said the Committee of Inspection should not consist of less than three or more than five.

Mr. Collins proposed Mr. Urmson (Messrs. Glover, Urmson, and Glover); Mr. Pearce (Messrs. Johnson, Clapham, and Morris); Mr. Galloway (Wigan and Whiston Coal Company); and Mr. Ward (Ironbarrow Lime Company).

The Chairman asked if there was any objection to the proofs of the firms represented by those gentlemen.

Mr. Newsome: You are acting, Mr. Chairman, in a very unfair manner. You ought to know whether there is any objection to those proofs, or proxies either.

The Chairman: There is no objection as far as I know.

Mr. Newsome: You ought to know better.

The Chairman: What is it I ought to know?

Mr. Newsome: You ought to know better than ask the question.

The Chairman: Have you finished?

Mr. Newsome: Yes.

The Chairman: Is there any objection to these gentlemen going on your committee through anything in consequence of their proofs? If not, and there are no other names to propose, I shall declare the resolution carried.

No objection having been raised, and no other names having been mentioned,

The Chairman declared the resolution carried, and announced that that was all the business.

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The following is a list of the amounts owing to the firms represented at the meeting:—Executors of the late W. L. Evans, £6,911; Messrs. Glover, Urmson, and Glover,

£83. 12s. 8d.; Messrs. Pilkington Brothers, £92. 7s. 9d.; St. Helens Collieries Company Limited, £346. 5s. 9d.; Mr. P. Speakman, £20. 18s. 4d.; Mr. T. Laithwaite, £65. 10s. 5d.; Messrs. Watkins and Soulby, £36. 1s. 7d.; Mr. William Newsome, £325. 16s. 7d.; Buxton Lime Company, £114. 10s. 11d.; Messrs. Johnson, Clapham, and Morris, £801. 6s. 3d.; Mr. F. Dixon, £67. 7s. 5d.; Messrs. Thompson and Crippen, £160. 5s. 1d.; Messrs. Oppenheim and Malkin, £196. 5s. 10d.; Lancashire Alkali and Sulphur Company, £692. 15s. 3d.; Mr. Morris, £5. 2s. 5d.; Mr. Parkinson, £45. 2s.; Messrs. Guthrie and Scrymgeour, £23. 0s. 10d.; Mr. Melling, £170. 4s.; Mr. S. Kidd, £33. 15s. 1d.; Mr. White, £67. 10s. 3d.; Mr. J. Varley, £666. 1s. 1d.; Mr. J. Ward, £356. 7s. 3d.

# Trade Notes.

The Bede Metal and Chemical Co. Limited.—The fifteenth annual report of this company has been issued. The directors state that the accounts for the year ending 31st December last show a net profit of £768. 18s. 5d. after meeting interest on loans and debentures, cost of reconstruction, and other special expenses. The rise in the price of copper began in October, but the directors were unable to take advantage of the market to any appreciable extent until after the turn of the year.

The Rio Tinto Company Limited.—The report and accounts of the directors of this company for the past year state that, after providing for all interest and expenses of administration, including income and other taxes, the £59,280, the amount of drawn bonds, the sum of £5,974 for plant, etc., written off, and £102 for bad debts incurred in 1887, besides writing off £2,500 off the Huelva Hotel investment, and £9,500 off the establishments at Garston, Crom Avon, and elsewhere, there remains a net profit available for dividend of £352,269. The interim dividend of 3s. per share absorbed £48,750, and the directors now recommend that a final dividend of 17s. per share (£276,250) be paid, making together 10 per cent. per annum, leaving a balance of £27,260 to be carried forward.

The Oakbank Oil Company Limited.—The report by the directors of this company to the third annual general meeting of the company, to be held on the 16th inst., states that after writing off depreciation at the rate of 7½ per cent., amounting to £4,670. 12s. 1d., the balance at the credit of profit and loss account is £6,764. 8s. 4d., which the directors recommend should be disposed of as follows:—£4,050 in payment of a dividend (free of income tax) at the rate of 6 per cent. on the paid-up capital of the company, payable one-half on 15th June and the other half 14th December, 1888; leaving £2,714. 8s. 4d. to be carried forward to next year. The works and plant have been maintained in good order, and renewals and alterations effected during the year at a cost of £5,015. 1s. 4d., which has been charged against revenue. The sum also of £500 has been added to the insurance fund, in order to bring that reserve more nearly into relation with the risk which the company is required to bear. In order to provide accommodation for the additional workmen required by the extended operations of the company, forty-eight houses have been erected during the year. No further extension in this direction is contemplated in the meantime.

Purity of Beer.—A bill for better securing the purity of beer has been introduced by Mr. Quilter, M.P. for South Suffolk. Its object is to enable the public to distinguish between beer when it is brewed from hops and barley malt and when it is composed of other ingredients. Every one who sells by wholesale or by retail, beer containing any other ingredients is directed by the bill to keep conspicuously posted at the bar or other place of sale a notice stating what those ingredients are. For not complying with this direction the penalty is a fine not exceeding £5, and in the case of a subsequent offence £20. In every case half of this fine is to be paid to the informer.

America and the Tin-plate Trade.—The quarterly meeting of the Tin-plate Workers' Association was held at Swansea on Saturday, and, in view of the agitation now proceeding in America with the object of inducing Congress to place a prohibitive duty on the import of tin-plates from England, the greatest interest was manifested in the proceedings. Mr. James Spence presided, and all the leading makers of England and Wales were present. After much discussion, in the course of which Mr. Philip's proposal to form a ring met with general condemnation, it was unanimously resolved that it was not desirable that any combination or syndicate should be formed which would interfere either with the production or the price of tin-plates. This resolution has given general satisfaction in the tin-plate district.

More Gold in Wales.—We learn that a magnificent discovery of gold has been made on a farm at Festiniog, North Wales, by Mr. Lowe, the well-known public analyst of Chester. The quartz on analysis yields five ounces of pure gold to the ton. The Government has been communicated with.

Pauper Aliens.—The Committee of the House of Commons on Emigration and Immigration was resumed yesterday. Mr. Henry Lindsey, chief officer of the Customs, London, said the authorities had no means of finding out whether the returns of masters of vessels regarding aliens were correct, and the Act of William IV. was not carried out. During last month about 400 Russians and Poles per week had arrived in London, and these were so destitute that they could not proceed further than the East End.

The Adulteration Act.—In the Queen's Bench Division, last week, before Justices Cave and Smith, the case of Betts *v.* Armstrong came on for hearing. This was a case stated by the justices of the borough of Notts for the opinion of the court, and came by way of appeal from a decision given by them on a question arising under the Sale of Food and Drugs Act, 1875. The question was whether, under the sixth section of the statute, a person selling to a purchaser an article of food not in the nature, substance, and quality of the article which the purchaser had demanded, was liable to penalties if he was not at the time aware that the article was not of the nature, substance, and quality demanded. In this case a local baker sold to the purchaser a loaf which was afterwards found to contain alum. Proceedings were taken in the matter by the borough inspector of nuisances. The baker said he was not aware that the loaf contained alum, and that if it did it must have been in the flour; and on the ground that he had no knowledge of the existence of alum in the loaf the justices dismissed the case. The inspector of nuisances appealed, and on his behalf it was contended by Mr. Stranger that the section of the act made the respondent liable to the penalty of £20, whether he knew that the bread contained alum or not. The court upheld that view, being of opinion that as nothing was said in the section about knowledge, the Legislature had intended that it should be excluded. The appeal, therefore, was sustained, and the case was ordered to go back to the justices, with the intimation that knowledge was not necessary.

Normandy Butter in England.—Mr. Bernal, Consul-General at Havre, in a report on the export from Normandy of butter adulterated with margarine, says there can be no doubt that a large proportion of the butter sent from Normandy to England is more or less mixed with margarine. In prosecutions reported from Lisieux, Caen, Bayeaux, and Alençon, the amounts stated to have been obtained on analysis ranged from 5 to 40 per cent. "Some experts, however, assert that it is possible to mix 10 and even 15 per cent. of margarine in such a manner as to defy detection; while, on the other hand, many cooks maintain that butter thus falsified will always show the presence of margarine by 'spitting' in the frying pan. Many butter merchants declare that the article is really improved by the admixture of good margarine, which they say takes away the strong flavour of some sorts;" and Mr. Bernal mentions a case where an exporter to London, who had been in the habit of mixing it with margarine, sent a consignment that was quite pure. He was promptly informed by the consignee that the article was of very inferior quality. A second lot, likewise unadulterated, was sent; in reply he was told it was unsaleable, so that it would appear a taste for this doctored butter has grown up. "In conclusion, I think it can be taken for granted that the greater portion of the Normandy butter sent to England, and especially that of second-class quality, is or has been more or less mixed with margarine, and that in some cases, when it does not exceed 10 or 12 per cent., the mixing is so skilfully done as to defy detection by analysis."

Steamship Lines offer Rebates to Shippers.—Competition with the tramp steamers plying between New York and London has become insupportable to the regular lines, and they have formed a combination for the purpose of protecting themselves. A circular signed by the agents of the National, Anchor, and Wilson lines has been addressed to exporters, informing them that on October 1 they will receive a rebate of 5 per cent. of the aggregate freights paid by them from April 1st to July 1st, 1888, on shipments of oil-cake, lubricating oil, sack flour, or provisions, engaged and

shipped under local bill of lading to London by direct steamers. Quarterly rebates will be paid covering shipments up to April 1st, 1889. The rebate will be paid only with the proviso that any and all shipments of the commodities named, in the export of which the shippers may be interested directly or indirectly, have been made exclusively for the six months preceding each of the dates when the rebate is due, on steamers represented by the subscribers to the circular. One of the agents is quoted as saying that the exportation of produce of the kinds covered by the circular had fallen off so much within the past year that the steamers of the regular lines very frequently sailed with large space of freight room unoccupied. It costs the companies a great deal to maintain regular dates and fixed time schedules, and in consideration of this they think the exporters ought to give them the preference over the merely occasional steamers.—*Oil, Paint, and Drug Reporter.*

# Correspondence.

## THE INSTITUTE OF CHEMISTRY.

*To the Editor of the Chemical Trade Journal.*

Sir,—I hope the country members of the Institute will rally round Mr. Hehner's standard, and support him in the fight he has begun against the officialism of the Institute of Chemistry. But there is one point I cannot admit from some of your correspondents as being correct, and that is, that the London members as a body are ever ready to wage war against the country members. It is quite true, however, that considerable feeling is shown by many of the metropolitan members of a certain class against unofficial interference with the management of the affairs of the Institute, and if the country members knew as much as I do of the "ins and outs" they would, I feel sure, combine and help us dissentient London members with all their heart and soul to put an end to the present state of affairs. The fact is, that the reason why outside members have not hitherto succeeded in getting the council to listen to them is because the outside members have not been combined. To succeed, federation is necessary; and I quite agree with your correspondent in last year's volume who suggested that local meetings of Fellows of the Institute should be arranged for. Of course, the council will not do anything to aid in such a movement, as it is decidedly against their interests; but I feel certain that, without such is done, we shall never have any reform.—I am, etc.,

A London Fellow.

*To the Editor of the Chemical Trade Journal.*

Sir,—In answer to your correspondent "An Analyst of many years standing," I think it advisable to wait to see what the present council propose to do in the way of reforming the Institute before taking any further action. I may say the matter is at present under their consideration.

The suggestion made by your correspondent is a good one if it be considered necessary for the Fellows outside the council to insist on their views being carried into effect.

I am, etc., William Thomson.

Manchester, 7th May, 1888.

## CHLORIDE OF POTASSIUM.

THE quantity of muriates of 80 per cent. produced at Stassfurt during the year 1887 amounted to over 93,000 tons, being an increase of 16,000 tons over the production of 1886.

Of the 93,000 tons, Germany consumed 41,000 tons; England, 9,000; Scotland, 8,700; France, 13,000; Belgium and Holland, 8,500; and Italy, 5,800 tons. The amount of muriates employed in Agriculture is constantly increasing: in Belgium the quantity thus consumed in 1885 was 2,590 tons, and in 1887, 4,645 tons. It is not easy to exactly apportion how much goes to agriculture and how much to the manufactures, but during 1887 Belgium consumed 3,520 tons in the various industries using it, against 4,645 tons employed in the cultivation of the soil. The potash refineries of the north of France also produce about 1,000 tons per annum of 90 per cent. muriate, a large quantity of which finds its way into agriculture. It is believed that about 4,600 tons are transformed in France, and 4,000 tons in Belgium by the reaction $NaNO_3K\,Cl = K\,NO_3 + NaCl$.—*L'Engrais.*

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

In the business sense, Glasgow, and with it a large share of the West of Scotland, are utterly demoralised to-day over the opening of the Exhibition, a formality which has just been successfully performed by the Prince and Princess of Wales. Yesterday also, as a Bank Holiday, was devoid of the customary market manifestations, but it is understood that chemicals as a whole are still suffering from the evils of depreciation and lack of vigour in the demand. Business to the close of the week was marked by a slight fall in caustic soda, and a continued absence of buoyancy in sulphate of ammonia and nitrate; while as for the others, the best that can be said is that they are no worse than formerly. Goods which are kept from falling below a certain point by the artificial means of a combination amongst makers are for the most part very sickly in demand, and this applies particularly to bichromates and paraffins. In the former, the new business on report last week was considerably under the bulk of the foregoing period, and it is needless to say much under normal figure. Paraffins are all more or less stagnant, buyers affecting a waiting game as long as they can do so with prudence. General prices are:—Soda crystals, 40s. net Tyne; alum, in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid £41 net Glasgow; soda-ash, 48/52°, 1d., less 5 % Tyne; caustic soda, white, 76°, £8. 5s.; 70/72°, £6. 17s. 6d.; 60/62°, £5. 17s. 6d.; and cream, 60/62°, £5. 15s. 0d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks £5, and 1 cwt. casks £5. 5s. net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 21s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash 4¼d., and of soda 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 7½d.; chlorate of potash, 5⅞d., less 5 % any port; sulphate of ammonia, £11. 5s. f.o.b. Leith; sulphate of copper, £21. 10s.; paraffin scale, hard, 2 1/16d., soft, 2d.; paraffin wax, 120° semi refined, 2 1/16d.; paraffin spirit 4½d.; burning oil, 5⅜d. to 6d.; lubricating oil, 865°, £5 to £5. 5s.; 885° £6 to £6. 10s.; and 890/95°, £7 10s. to £7. 15s. Sugar imports at Greenock last week were 60,077 bags and 13,285 baskets.

## THE LIVERPOOL MINERAL MARKET.

The market has continued steady, and there is practically no alteration in prices. Manganese: There has been more doing, but prices are unaltered. Magnesite (containing 98 % of carbonate of magnesia) steady at 30s. to 35s. for raw lump; raw ground, £6. 10s., and calcined ground £10 to £11. Bauxite: Increased sales have been made, and prices are firmer; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk continues in increased demand, a fair quantity having been sold at full prices—87s. 6d. to 90s. for medium, and 95s. to 100s. for best. Barytes (carbonate): The good demand continues. Selected crystal lump is scarce at £6; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone in demand; ground, at £6. 10s. to £7; specially selected lump, finest quality, £10 to £10 10s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone: Best brands are in good demand at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore still in fair demand and prices are firm, with a probability of an increase. Antimony ore firm; £16 to £22 for fair quality. Antimony metal, unchanged. Uranium, 20s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady;

(celestine), 17s. 6d. more doing. Carbonate (native), £16; powdered (manufactured), £11 to £12. Lime- 5s. for ground. Plumbago: Best Ceylon lump is £35; good, £20 to £21; chips, £8 to £16; best £20, £25, and £30; Italian and Bohemian, £4 to ton according to quality. French sand, in cargoes, 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; cked, £10; 60 % packed, £8. 16s.; 50 % unpacked, 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to Bitumen, finest picked, £35; original prime, £18 and good, £8. Ground Mica, £50. China Clay, at : Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; to 35s.

## IVERPOOL CHEMICAL MARKET.

ICALS continue in fair demand, and prices have l without much alteration. Soda-ash 1d. up. Caustic % white, £6; 60 % cream, £5. 17s. 6d.; 70 % white, £7. 10s.; 76 % £8. 5s. to £8. 7s. 6d. Bicarbonate, Nitrate of soda 9s. 6d. to 10s. 6d. Soda crystals, 6d. Silicate of soda: Brown lump, £6. 15s.; green 5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and tion, £3. 12s. 6d. Bleaching powder, £7. 15s. wood, and £7. 10s. softwood, Saltcake at 21s. 6d. ate of potash at 4¾d. Bichromate of soda, arbonate of potash, £18 to £20. Chlorate of 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of 21s. to 23s. Chloride of barium, £9. Hydrate of 12s. Dioxide of barium 8½d. per lb. Arsenic £12. 5s. 10s., strong. Lump, little offering. Saltpetre: , 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, best thirds, £4. 10s. Sulphate of copper, firm at lanc fixe, £8. 10s. Manganese: Sulphate, £16 to oride of manganese, £20 per ton; carbonate, £12 10s.; est English make, 6d. Hydrate of alumina, £24. 10s. ated carbonate of magnesia, 50s. Chloride of mag- (antiseptic) strong at 45s. to 50s. Chloride of calcium, som salts, 70s. to 75s. Muriate of ammonia: White, fined borax unaltered. Verdigris, 1s. per lb. Acetate £12. 5s. Bisulphide of carbon, £15. Chloride of 7d. to 8d. per lb. Montreal potashes, 24s. Pearl 2. 3s. Chloride of zinc (solid), £18.

## E LIVERPOOL COLOUR MARKET.

RS have continued quiet, without much change in Ochres: Oxfordshire is quoted £10, £12, £14, and erbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. French, J.C., 45s., 55s., to 60s.; M.C., 65s. to 67s. 6d. Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 5s. White lead, £21. 10s. to £22. Red lead, £19 Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, Terra Alba: Finest white, 60s.; good, 40s. to 50s. Best, £24; ditto for jewellers, 1s. per lb. Drop 5s. to 28s. 6d. Oxide of iron, prime quality, £10 to ris white, 60s. Emerald green, 10d. per lb. Derby- , 60s. Vermilionette, 10d. per lb.

## CELLANEOUS CHEMICAL MARKET.

.I manufacturers continue to be well engaged with the leading brands of soda-ash, and prices are well ed. In caustic soda the market is rather easier d prices seem to be inclined to recede to their old Bleaching powder meets with steady sale, and e not materially affected. Sulphate of copper does to makers' expectations, and though resales are to be pretty well exhausted there are still some offering at £21 to £21. 10s. per ton. Oxalic acid is find buyers at 3d. per lb. Acetic, tartaric, citric, nic acids are all to be had in buyers' favour. Tin continue to droop, the price of the metals being wer. Lead is rather weaker, but litharge and salts are as reported last week. The demand for crystal id carbolic acids has to some extent fallen off, and there is general expectation that the price of crude will recede from present quotations. Picric acid is also rather easier. Ammonia and salts (except sulphate) are unchanged in value, but muriate of ammonia is rather less plentiful.

## THE TAR PRODUCTS MARKET.

THE benzol market continues to droop even in the face of the small make now coming in; 90's can only be said to be value from 2s. 10d. to 2s. 11d., and 50/90's from 2s. 4d. to 2s. 5d. Crude naphtha is easier, owing to absence of buyers, at current rates. A fall is anticipated in crude carbolic, and anthracene is not so firm as formerly, though quotations are unchanged. The pitch season is practically over, but there are not such large stocks as at this time last year, much having been cleared off during the cold weather.

## THE SULPHATE OF AMMONIA MARKET.

THE market, though quiet, is steady for prompt shipment. Hull is setting at £11. 3s. 9d. to £11. 5s., and sales at this latter value have been made at Leith. Beckton is nominally quoted at £11. 12s. 6d., though some quantity has been offered of outside makes on Beckton terms at £11. 5s. London generally has been offering at £11. 7s. 6d. The market is in a critical state, and needs careful watching by intending sellers.

# New Companies.

ANGLO-AMERICAN OIL COMPANY LIMITED.—Capital, £500,000 in £20 shares.

BOURNEMOUTH ELECTRICITY COMPANY LIMITED.—Capital, £50,000 in £5 shares.

GASEOUS AND LIQUID FUEL SUPPLY COMPANY LIMITED.—Capital, £50,000 in £10 shares.

GOLD MINES OF WALES LIMITED.—Capital, £250,000 in £1 shares.

GREAT NORTHERN BRICK, TILE, AND SANITARY PIPE COMPANY LIMITED. Capital, £15,000 in £1 shares.

GREAT NORTHERN SALT AND CHEMICAL WORKS LIMITED.—Capital, £200,000 in £1 shares and debentures.

GRINTON MINING AND SMELTING COMPANY LIMITED.—Capital, £50,000 in £1 shares.

HOPE IRON, STEEL, AND TIN PLATE COMPANY LIMITED.—Capital, £25,000 in £10 shares.

LIVERPOOL PURE ICE COMPANY LIMITED.—Capital, £20,000 in £1 shares.

"MAGIC CLEANER" AND POLISHING POWDER SYNDICATE LIMITED.—Capital, £2,000 in £1 shares.

MANCHESTER ZINC AND AMMONIA COMPANY LIMITED.—Capital, £25,000 in £10 shares.

NORMAL MANURE COMPANY LIMITED.—Capital, £10,000 in £1 shares.

PROTEAN BATTERY SYNDICATE LIMITED.—Capital, £5,000 in £10 shares.

WEBSTER'S WOOD FIBRE PACKING COMPANY LIMITED.—Capital, £5,000 in £1 shares.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

BOULTON & MILLS, Stourbridge, glass manufacturers.

G. A. BROWN and C. CADBY, Birmingham, drysalters and oil and colour merchants.

MANDENO, SON, & ROBERTSON, Liverpool, drysalters.

T. TAYLOR & CO., Blackford-bridge, Standish Bleach and Dyeworks, near Wigan, and Manchester, bleachers and dyers.

HUGH BROWN & SONS, Edinburgh, Liverpool, and Halstead, Essex, tanners, etc.

S. & H. HIPKINS, West Bromwich, boiler makers.

LATHAM & HAXBY, Halifax, ironfounders.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

FORRESTER, THOMAS, Crosse-hall Mills, Chorley, Lancashire, dyewood miller.

EVANS, JOHN COOPER, Eveline-villa, Dacre-road, Upton Manor, late of Boston-road, Hanwell, oil and colourman.

WOOD, JOHN, Oldham, wholesale druggist.

#### Adjudications.

ALDERTON, FREDERICK WILLIAM, Norwich, drysalter.

EXLEY, THOMAS (trading as J. Exley & Son), late of Horsforth, near Leeds, now of Pudsey, near Leeds, late tanner.

FORRESTER, THOMAS, Chorley, Lancashire, dyewood miller.

LOCKWOOD, WILLIAM, and LEITH, JOHN, St. Helens, chemical manufacturers.

#### First Meetings and Public Examinations.

ALDERTON, FREDERICK WILLIAM, Norwich, drysalter. May 12, Official Receiver's office, Norwich; May 16, Shirehall, Norwich.

MEAKIN, RICHARD, Newton Burgoland, Leicestershire, brick and tile manufacturer. May 11, 28, Friar-lane, Leicester; June 6, Castle, Leicester.

KROLL, LUDWIG (trading as L. Kroll & Co. and the British Hygienic Company), Blundell-street, Caledonian-rd., late of Mark-lane, chemical manufacturer. May 15, Bankruptcy-buildings, Portugal-street, Lincoln's-inn-fields; May 31, 34, Lincoln's-inn-fields.

### Notices of Dividends.

COLEBY, SAMUEL JAMES, and DURRELL, JOHN, Norwich, curriers and leather cutters. First and final dividend of 5s. 1d., any day, Official Receiver's office, Norwich.

CURTIS, ALBERT AUGUSTUS, Gloucester, and Sharpness, Gloucestershire, chemist, druggist, and sauce manufacturer. First and final dividend of 1s. 6¾d., May 12, 30, Brunswick-road, Gloucester.

FITZGIBBON, GERALD (trading as Gibbon & Co.), late of Eastcheap, City, and Liversedge, Yorkshire, residing at Headingley, near Leeds, dyewood and drysaltery broker. Final dividend of 4¾d., May 14, 71, Eastcheap, E.C.

FAULKNER, JOHN, Manchester, electric engineer. First and final dividend of 6s. 5 2-5d., any day, Official Receiver's office, Manchester.

TAYLOR, GEORGE JOHNSON, Manchester, and Crumpsall, Lancashire, calico printer. First and final dividend of 10 2-9d., any day, Official Receiver's offices, Manchester.

TOOTH, GEORGE, Nottingham, currier. Second and final dividend of 1s. 11d., any day, Trustee's offices, St. George's-chambers, Grey Friars, Leicester.

# The Patent List.

*The following List has been compiled expressly for* THE CHEMICAL TRADE JOURNAL *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Apparatus for treating Bodies at a High Temperature.** A. R. Pechiney. 18041. May 3. Antedated Nov. 17, 1887, under International Convention.
**Primary and Secondary Batteries**—(Complete Specification). A. Millar. 6237. April 27.
**Wringing Sized or Dyed Yarns.** S. Walker. 6246. April 27.
**Purification of Nitric Acid.** J. Dawson and R. Hirsch. 6248. April 27.
**Torrefying Grain.** W. R. Clarke. 6256. April 27.
**Cement.** J. C. Cellars. 6261. April 27.
**Manufacture of Tin and Terne Plate.** D. Whitehouse. 6276. April 27.
**Explosive Compounds.** L. Bonneville. 6280. April 27.
**Filtering Liquids.** O. A. Berend. 6282. April 27.
**Apparatus for producing Jets of Spray**—(Complete Specification). P. Born. 6285. April 27.
**Internal Flues for Steam Boilers.** H. Foster. 6288. April 28.
**Utilisation of Exit Gases from Vitriol Chambers.** J. Ruffle. 6307. April 28.
**Lamps for Burning Paraffin Oil.** W. Sands. 6313. April 28.
**Dynamo-Electric Machines.** J. P. Hall. 6314. April 28.
**Manufacture of Dyestuffs.** J. Y. Johnson. 6319. April 28.
**Galvanic Batteries.** P. R. de F. d'Humy. 6322. April 28.
**Distillation of Hydrocarbon Liquids.** N. J. Fenner. 6325. April 28.
**Manufacture of Iron.** A. G. Greenway. 6326. April 28.
**Mechanical Pulveriser.** C. Volonté. 6328. April 28.
**Evaporating Saline Solutions.** E. Saner. 6329. April 28.
**Combustion of Mineral Oils.** G. A. Diétrich. 6339. April 28.
**Screening Drums for Coal, etc.** J. Imray. 6340. April 28.
**Treatment of Coal.** J. Imray. 6341. April 28.
**Purification of Gas.** S. Chandler, jun., and J. Chandl April 28.
**Sorting Minerals and other Bodies.** G. Kilgour. 6348. Ap
**Purification of Water in Steam Boilers**—(Complete Spec H. T. Yaryan. 6352. April 28.
**Storing and Compressing Air.** F. E. Townsend. 6370. Ap
**Gas Burners for Heating and Cooking.** J. F. Wright a Wright. 6372. April 30.
**Electric Batteries.** L. Dill. 6373. April 30.
**Bankers' Cheques.** H. Ellison. 6374. April 30.
**Filters.** T. P. Miller and J. Bennie. 6375. April 30.
**Composition for Covering Kilns, Ovens, etc.** S. P. M J. Oswald. 6389. April 30.
**Regulating the Draught of Furnaces.** W. P. Thompso April 30.
**Apparatus for Precipitating Suspended Matter in Fluid** Lipscombe. 6405. April 30.
**Disinfectants.** H. H. Lake. 6407. April 30.
**Improved Process for Dyeing Leather.** G. F. Landaue April 30.
**Galvanic Batteries**—(Complete Specification). L. Hoppe and 6416. May 1.
**Packing Soft Soap.** J. Taylor. 6428. May 1.
**Stoppering Barrels.** P. Rothwell, E. Wild, and G. H. Herbe May 1.
**Soft Soap.** J. Taylor. 6428. May 1.
**Gaseous Fuel-producing Apparatus.** B. H. Thwaite. 6432
**Coating Metal Plates with Tin or Terne.** J. Williams. 645
**Extraction of Aluminum.** H. H. Lake. 4460. May 1.
**Motive Power from Inflammable Vapours**—(Complete Spec K. von Kortynski. 6468. May 1.
**Recovery of Refuse Metal.** J. E. T. Woods. 6470. May 1.
**Centrifugal Apparatus**—(Complete Specification). G. F. 6487. May 1.
**Improved Means of Producing a Motive Agent.** G. W. 6489. May 1.
**Tanning.** H. Levick. 6491. May 1.
**Manufacture of Metallic Oxides**—(Complete Specification). 6495. May 1.
**Regulating the Quality of Carburetted Vapours**—(Comple fication). E. J. Frost. 6496. May 1.
**Explosive Shells**—(Complete Specification). J. W. Graydo May 1.
**Generating Steam in Boilers by Artificial Draught.** F. W and G. P. Addison. 6505. May 1.
**Utilising Waste Amber.** J. Scaife. 6508. May 2.
**Treating Soluble Sulphides and Sulphates for the pur converting them into Carbonates.** B. H. Thwaite. 6513.
**Gas Producers.** A. Wilson. 6514. May 2.
**Galvanising or Tinning Wire Netting.** C. Wilcox and H 6524. May 2.
**Slag Manure.** A. Bödtker. 6532. May 2.
**Mills for Grinding Substances.** W. Adair. 6540. May 2.
**Regulating the flow of Liquids.** A. Pohlman. 6547. May 2.
**Colouring Portland Cement.** W. Cussans. 6557. May 2.
**Apparatus for Stirring and Mixing.** F. Edenborough. 6559
**Explosive Compounds.** A. V. Newton. 6560. May 2.
**Lubricators.** R. Brigham. 6565. May 2.
**Liquid Fuel Stoves.** L. W. Leeds. 6569. May 2.
**Machinery for Treating, Bleaching, and Washing Materials.** E. Brazier. 6570. May 2.
**Gas Stoves.** W. Garland and W. T. Crooke. 6571. May 2.
**Steam Traps.** J. Wrigley. 6573. May 2.
**Operating on Jute and Rhea Canes.** J. R. Day. 6581. May
**Drawing off Liquids from Casks.** J. Bell. 6582. May 2.
**Coffee Substitute.** R. Chodat and P. Chuit. 6616. May 3.
**Improvements in the Refining of Camphor.** M. J. Schreite May 3.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending April 28th.*

**Arsenic**—
Germany, 50 cks. Wms., Torrey & Co.
" 100 " Burgoyne, Burbidges & Co.

**Alkali**—
Holland, 90 c. J. James

**Acetic Acid**—
Holland, 140 crbys. Zimmermann
" 20 bkts. Beresford & Co.

**Bones**—
Wellington, 2 t. N. M. & A. Co.
" 16 T. W. Brand

**Barytes**—
Germany, 41 cks. Beresford & Co.
Belgium, 33 " J. L. Lyon & Co.
" 23 " Ross & Deering
Germany, 25 " W. Harrison & Co.
" 19 " W. G. Taylor & Co.

**Brimstone**—
Belgium, 8 t. Forwood Bros. & Co.
Italy, 15 C. J. Capes & Co.
" 25 Union Lighterage Co.
" 15 H. S. Smith & Co.
" 15 J. Morgan
" 20 F. Smith
" 5 J. Knill & Co.
" 2 C. H. Gray

**Bromide Iron**—
Germany, 22 cks. Zimmermann

**Bromine**—
Germany, 20 cs. A. & M. Zimmermann

**Borax**—
France, 20 cks. J. Puddy & Co.
Italy, 17 " J. Puddy & Co.

**Boracic Acid**—
Italy, 10 cks. J. Puddy & Co.

**Caoutchouc**—
Cape, 57 c. E. & W I. D. Co.
Natal, 100 Rennie, Son & Co.
France, 2 G. W. Boulton
" 120 Flageollet & Co.
Cape, 1 E. & W. I. D. Co.
Inhambane, 12 Kebbel Son & Co.
Mauritius, 11 "
Madagascar, 25 Perkins & Homer
Germany, 15 H. Lambert
France, 42 Flageollet & Co.
E. Indies, 44 T. Merry & Son
" 19 Beresford & Co.
Zanzibar, 15 Rehder & Co.

**Chemicals** (*otherwise undescribed*)
Germany, £820 A. & M. Zimmermann
" 200 "
" 6 Craven & Co.
" 429 A. & M. Zimmermann
" 14 L. & S. K. D. Co.
" 8 Phillipps & Graves

**Chemicals.**—*continued.*
Germany, £678 A. & M. Zimmermann
" 20 W. Harrison & Co.
" 28 Burgoyne & Co.

**Cream Tartar**—
Italy, 40 cks. Sutcliffe & Gosden
" 5 " W. V. Robinson & Co.
" 17 " Webb, Warter & Co.
" 15 " C. F. Gerhardt
" 2 " M. Ashby
" 381 bgs. J. Turner & Co.
" 59 cks. B. Jacob & Sons
France, 1 ck. Skilbeck Bros.
" 12 cks. Webb, Warter & Co.
Italy, 10 " Fellows, Morton & Co.
France, 10 pkgs. Allan Bros. & Co.
" 5 cks. Webb, Warter & Co.
Jersey, 1 ck. S. Hanson, Son & Co.
Italy, 6 cks. Howards & Son

**Carbolic Acid**—
Germany, 2 cs. Webb, Warter & Co.

**Dextrine**—
Germany, 21 cks. Burgoyne, Burbidges & Co.

**Dyestuffs**—
**Aniline**
Holland, 30 cs. P. & O. Co.
**Annatto**
B.W.Indies, 6 brls. C. H. Stewart

**Anthracene**
France, 82 cks. Burt, Boulto
**Argols**
Italy, 1,012 bgs. B. Jacob & S
" 767 bgs. Union Lighter
" 2 cks. T. W
**Cutch**
Italy, 350 bxs. Johnson, Roll
Auckland, 387 bxs. V. der Mel
**Extracts**
France, 70 cks. Levinstein
Denmark, 4 cks. Bailey & L
U. States, 100 bxs. Prs. Brook
Germany, 80 " Herrman Kelle
" 4 cks. E. & W. I
**Gambier**
E. Indies, 206 bls. L. & S. K
" 473 bgs. Beresfor
" 82 " Baxter &
**Indigo**
E. Indies, 10 chts. E. & W. I
" 28 " L. & S. K
" 19 " Vokins &
" 1 " L. & S. K
" 10 " Cundall
" 34 " Bernec cha
" 64 " V. Glehn
" 141 " Arbuthn Latha

**estuffs—Indigo**—*Continued.*

Indies, 8 chts. E. & W. I. D. Co.
" 1 " Arbuthnot, Latham & Co.
" 47 " Patry & Pasteur
" 2 " P. & O. Co.
" 5 " Philips & Graves
" 10 " J. Owen
" 8 " Stansbury & Co.
" 3 " Pittis & Son
lon, 7 " L. & S. K. D. Co.
Indies, 5 " Elkan & Co.
" 9 " J. Allen & Son
" 14 " Brandt Son&Co.
ina, 7 " V. Glehn & Sons
Indies, 125 " L. & S. K. D. Co.

**abolams**
ndies, 650 bgs. Humphery & Co.
" 197 " Leach & Co.
" 1,131 " M'shall & French
" 398 " Humphery & Co.
" 440 " Hoare, Wilson and Co.
" 1,306 " Humphery & Co.
" 600 " Armitage, Fry, and Co.
" 1,334 " V. Glehn & Sons

**hella**
d, 152 bls. Rennie, Son & Co.
dies, 49 bls. Beresford & Co.

**Iron**
in, 1 cs. Prs. Chamberlain's Whrf
, 150 bgs. W. France

**mac**
, 200 bgs. J. Kitchin & Co.

**ners' Bark**
land, 85 t. Weatherley, Mead and Co.
bourne, 36 Baxter & Hoare
kland, 24 Meden Bros. & Co.
" 9 E. & W. I D. Co.
bourne, 9 Baxter & Hoare

**meric**
ndies, 1,000 bgs. G. & H. Green
" 1,000 " "
" 500 " W. Young
" 1,000 " Greeff & Co.

**erine—**
land, £548 Spies Bros. & Co
nce, 35 Baxter & Hoare
" 210 Domeirer & Co.
" £150 Prs. Chamberlain's Whrf
sia, 655 Leach & Co.
many, 148 Craven & Co,
" 36 Beresford & Co.
sia, 170 "

**ta Percha—**
ium, 1 c. D. C. Thomas & Son
dies, 185 c. J. H. and G. Scovell

**ose—**
many, 410 c. H. Evans.
" 220 Hyde, Nash & Co.
" 1,040 T.M.Duche & Sons.
" 169 Andorsen, Becker, and Co.
" 500 J. Knill & Co.
" 250 T. L. Lee
" 300 J. F. Ohlmann
" 60 M. D. Co.
" 200 P. Windmuller
" 108 J. Barber & Co.
" 110 M. D. Co.
200 Pickford & Co.
300 M. D. Co.
100 J. Knill & Co.
346 Anderson Weber & Co
200 Seaward Bros.
530 L. Sutro & Co.
104 Sothers & Co.
240 Fellows, Morton & Co.
500 J. F. H. Ohlmann
220 Barrett, Tagant & Co.
244 J. Cooper
509 Prs. Chamberlain Wrf
280 T.M. Duche & Sons
13 pkgs. P. Windmuller

**ass—**
d, 3 bgs. A. W. Paterson
s, 36cs. Adamson & Ronaldson
7 " Clark & Smith
y, 4 " D. Taylor & Sons
3 " "
s, 5 " L. & S. K. D. Co.

**e—**
**hate of Lime**
, 175 t. Lawes Manure Co.

y, 25 t. Petri Bros.
30 Hunter, Waters & Co.
50 B. Jacob & Son.
50 Hunter, Waters & Co.

**ate Rock**
, 270 t. Anglo Guano Works

, 10 t. F.W.Berk & Co.

**ate**
120 t. D. de Pass & Co.

, 22½t. C. A. & H. Nichols

**Potassium Carbonate—**
France, 16 cks. J. A. Reid

**Plumbago—**
Germany, 21 cks. W.G.Davies & Son

**Paraffin Wax—**
Germany, 109 cs. H. Hill & Sons
U.States, 291 " G. H. Frank

**Potassium Cyanide—**
Germany, 6 cs. Craven & Co.

**Potassium Muriate—**
Germany, 813 bgs. Fellows, Morton and Co.

**Pearl Ash—**
Holland, 95 c. F. W. Berk & Co.
Germany, 103 "

**Potassium Sulphate—**
Belgium, 222 bgs. J. Angus & Co.

**Pyrites—**
Spain, 98 t. C. Tennant, Sons & Co.

**Pitch—**
France, 40 brls. H. Hill & Sons

**Sodium Acetate—**
France, 10 cks. A. Zumbeck & Co.
" 8 " W. G. Blagden

**Soda Salts—**
Germany, 4 cks. H. Lorenz

**Sugar of Lead—**
Germany, 5 cks. A. Zumbeck & Co.

**Strontia Nitrate—**
Germany, 28 cks. G. Boor & Co.

**Salicylic Acid—**
Germany, 30 cs. Burgoyne, Burbidges & Co.

**Saltpetre—**
Germany, 70 cks. J. Hall & Son
" 48 " Brown & Elmslie
" 602 bgs. Clift, Nicholson and Co.

**Sodium Nitrate—**
Iquique, 11,015 bgs. W. Montgomery and Co.

**Tartaric Acid—**
Holland, 3 cks. Middleton & Co.
France, 10 brls. Allan Bros. & Co.
Belgium, 16cks. Union Lighterage Co

**Tar—**
Russia, 2 brls. Chope & Co.

**Tartars—**
Italy, 388 bgs. J. Turner & Co.
" 1 ck. T. W. Brand
Belgium, 3 cks. Union Lighterage Co

**Ultramarine—**
Holland, 16 cks. A. Henry & Co.
Belgium, 7 " Leach & Co.
Germany, 1 cs. H. Lambert
Holland, 1 ck. F. Williams
" 42 cs. H. Kohnstann
Germany, 73 pkgs. G. Steinhoff
France, 4 brls. G. Rahn & Co.
" 2 cks. W.H. Carey & Sons

**Verdigris—**
France, 2 brls. C. F. Gerhardt

**Zinc Oxide—**
Germany, 100 cks. J. Mattan
Holland, 26 " Phillips & Graves
" 250 " T. Hubbuck & Son

## LIVERPOOL.

*Week ending May 2nd.*

**Alkali—**
Rotterdam, 40 kegs.

**Acetate of Lime—**
St. Nazaire, 80 bags.

**Barytes—**
Rotterdam, 23 cks.
" 22 brls.
Antwerp, 100 bags. J.T.Fletcher & Co.

**Boracic Acid—**
Leghorn, 10 cks.
" 20 "

**Brimstone—**
Catania, 200 t.
" 150

**Chemicals** *(otherwise undescribed)*
Rotterdam, 2 cks.
" 4 "

**Copperas—**
Hamburg, 18 brls.

**Camphor—**
Hamburg, 1 cs. 1 ck.

**Cream Tartar—**
Barcelona, 5 cks Sachse & Klemm
" 5 "
Patras, 16 cs. Coursi, Raftopulo & Co.

**Copper Precipitate—**
Huelva, 100 t. Matheson & Co.

**Caoutchouc—**
Accra, 10 brls. 2 pns. F.&A.Swanzy
" 1 ck. 23 brls. C. Lane

**Caoutchouc**—*Continued.*

Accra, 4 brls. Pickering & Berthoud
Salt Pond, 5 cks. F. & A. Swanzy
C.C.Castle, 1cs. 2 brls. C.L.Clare & Co
" 1 3
Elmina, 2 brls. Boses, Bros. & Co.
Grand Bassa, 1 brl. Cie Francaise
Sierra Leone, 48 cks. "
" 17 brls. Pickering & Berthoud
Bathurst, 2 bxs. J. Walkden & Co.
" 4 cs. Kinloch, Campbell & Co.
" 17 brls. Cie Francaise
Rio Janeiro, 33 pkgs.

**Dyestuffs—**
**Alizarine**
Rotterdam, 19 cks.
**Argols**
Oporto, 23 cks. German Bank
" 25 brls. "
**Cochineal**
Las Palmas, 13 bgs. Lathbury & Co.
**Extracts**
New York, 8 brls.
St. Nazaire, 120 cks.
Hamburg, 2 "
**Myrabolams**
Bombay, 930bgs. Forbes, Forbes & Co
" 700 "
" 1,751 "
**Orchella**
Hamburg, 476 bls.
Lisbon, 80 " 20bgs. Carver & Co.
**Shumac**
Palermo, 150 bgs. Kitchen & Co.
" 100 " H.Rooke, Son & Co.
" 820 " 50 bls.
" 50 " 5 bxs. 7 cs.

**Glucose—**
Hamburg, 10 cks.
" 18 brls.

**Glycerine—**
Rotterdam, 5 carboys.

**Horn Piths—**
Rio Grande do Sul, 3,300. J. Fuchs and Co.

**Isinglass—**
Maranham, 5 cks. Gunston, Sons & Co

**Manure—**
**Bones**
Constantinople, 454 bags.
**Bone Meal**
Bombay, 5,325 bags.
" 1,460 "
**Kainit**
Hamburg, 1,000 bags.
**Phosphate Lime**
Treport, 3,000 bags.
**Phosphates**
Ghent, 250 bgs. J.T.Fletcher & Co.
Antwerp, 1,020 bags & 140 t.
**Waste Salt**
Hamburg, 500 t. Bagley & Co.
" 1,600 bags.

**Plumbago—**
Genoa, 80 bgs. Huntriss & Co.
" 80 "
" 35 cks.
Rotterdam, 5 cks.
Genoa, 20 brls.

**Pyrites—**
Huelva, 1,280 t. Matheson & Co.
" 1,629 "
" 1,454 "
" 1,061

**Pitch—**
Amsterdam, 12 cks.
Rotterdam, 50 tubs.

**Potash—**
Rotterdam, 73 cks.
Boston, 30 brls.

**Sugar of Lead—**
Hamburg, 10 cks.

**Stearine—**
Rotterdam, 5 bxs.
Antwerp, 4 cs.
Havre, 6 Cunard S.S. Co.

**Saltpetre—**
Hamburg, 54 kgs. 150 cks.
" 21 "

**Salts of Potash—**
Hamburg, 500 bags.
" 1,578 "

**Sulphur—**
Catania, 8 cks. 200 bags.
" 90 brls. 200 "

**Sodium Nitrate—**
Iquique, 15,685 bags.
" 8,533 "
" 9,409 " W. & J. Lockett
" 9,841 "

**Tartaric Acid—**
Rotterdam, 13 cks.
" 4 " 10 kgs.

**Tar—**
New York, 305 brls.

**Tartar—**
Naples, 6 cks. 8 cs.
" 5 " R. Powles

**Ultramarine—**
Rotterdam, 1 ck.
" 16 " 58 cs.

**Zinc Oxide—**
Antwerp, 52 cks. J.T.Fletcher & Co.
" 94 pkgs.

## GLASGOW.

*Week ending May 5th.*

**Alum—**
Rotterdam, 24 cks.

**Barytes—**
Antwerp, 197 cks. 604 bgs. Currie and Co.
Rotterdam, 13 cks.

**Cream Tartar—**
Italy, 2 cks.

**Dyestuffs—**
**Alizarine**
Rotterdam, 23 cks.
**Extracts**
Boston, 4 bxs. J. Dawson & Co.
New York, 5 brls.
Antwerp, 6 cks. 2 cs.
**Shumac**
Italy, 170 bags.

**Glucose—**
Rotterdam, 22 cks.

**Iron Oxide—**
New York, 100 brls. W. Lester
Trieste, 14 "

**Manure—**
**Waste Salt**
Hamburg, 293 bags. J.Poynter & Son
" 598 "
" 50 t. "

**Potash—**
Rotterdam, 23 cks.

**Pitch—**
Antwerp, 8 cks.

**Sodium Nitrate—**
Iquique, 9313 bgs. A. Cross & Sons

**Soda—**
New York, 4 cks.

**Ultramarine—**
Rotterdam, 1 ck. 2 cs.

**Zinc Oxide—**
Antwerp, 25 cs.

## HULL.

*Week ending May 3rd.*

**Alum—**
Amsterdam, 1 ck. Wilson, Sons & Co.

**Albumen—**
Hamburg, 21 cks. Wilson, Sons, & Co.

**Acetic Acid—**
Rotterdam, 1 ck. Hutchinson & Son

**Barytes—**
Bremen, 18 cks.
" 21 "
" 23 " Tudor & Sons
" 19 "

**Chemicals** *(otherwise undescribed)*
Hamburg, 3 cks. 2 cs. Wilson, Sons, and Co.
" 8 " 1 brl. "
Bremen, 1 cs. Veltmann & Co.
" 1 ck. T. Woodhouse
Dunkirk, 16 cks. Wilson, Sons, & Co.
Stettin, 33 pkgs. "
Antwerp, 51 bgs. 1 brl. "

**Dyestuffs—**
**Alizarine**
Rotterdam, 109 cks. W. & C. L. Ringrose
" 38 cks. 2 cs. 36 pkgs. Hutchinson & Son
**Indigo**
Amsterdam, 3 cs. Millboard & Cryer
**Madder**
Rotterdam, 1 ck. J. Pyefinch & Co.
**Extracts**
Dunkirk, 60 cks. Wilson, Sons, & Co.
Rouen, 415 cs. 50 cks. Rawson and Robinson
**Myrabolams**
Bombay, 5,667 bags.
Hamburg, 6 "

**Dextrine—**
Hamburg, 20 bgs. Bailey & Leetham

**Glucose—**
Hamburg, 14 cks. Wilson, Sons, & Co.
" 32 "
Stettin, 200 bgs. Wilson, Sons, & Co.
" 20 cks.
Hamburg, 46 "

**Glucose.**—*continued.*
Stettin, 23 cks. Wilson, Sons, & Co.
" 108 "
Rotterdam, 40 bgs. G. Lawson & Sons
**Manure**—
**Waste Salt**
Hamburg, 330 bgs. C. M. Lofthouse and Co.
**Manure**
Ghent, 1,852 bags.
**Pitch**—
Stettin, 34 cks. Wilson, Sons, & Co.
**Salammoniac**—
Rotterdam, 24 cks.
**Stearine**—
Rotterdam, 63 bgs. Hornby & Needler
Drontheim, 88 brls. Wilson, Sons, and Co.

**Sodium Nitrate**—
Pisagua, 17,760 cwt.
**Salt**—
Rotterdam, 7 cs. G. Lawson & Sons
**Tartaric Acid**—
Rotterdam, 17 cks. W. & C. L. Ringrose
" 6 " G. Lawson & Sons

## TYNE.

*Week ending May 5th.*

**Barytes**—
Rotterdam, 45 cks. Tyne S. S. Co.
**Copper Precipitate**—
Huelva, 9,035 bags.
" 1,059 " Bede Metal Co.

**Manure**—
**Phosphate Rock**
Coosaw, 586 t. G. & W. S. Burrell
**Pyrites**—
Huelva, 964 t. A. Guthrie
**Sodium Nitrate**—
Pisagua, 1,063 t. J. C. Swan & Co.

## GRIMSBY.

*Week ending April 30.*

**Manure**—
**Kainit**—Hamburg, 250 bags
**Zinc Ashes**—
Antwerp, 15 cks.

## GOOLE.

*Week ending May 2*

**Chromate of Soda**—
Rotterdam, 10 cks.
**Caustic Soda**—
Calais, 15 cks.
**Manure**—
**Phosphate**—Calais, 800 bags
**Potash**—
Dunkirk, 7 cks. 12 dms.
" 2 20
Calais, 8
**Potassium Carbonate**—
Hamburg, 65 cks.
**Potassium Muriate**—
Hamburg, 32 bags

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 1st.*

**Ammonia**—
Singapore, 6 c. £20
Hamburg, 13 dms. 26
**Ammonia Carbonate**—
New York, 50 pkgs. £370
**Ammonia Sulphate**—
Demerara, 36 t. £473
Calcutta, 46
Ghent, 343 bags 340
Demerara, 50 t. 7 c. 629
Trinidad, 10 122
**Arsenic Powder**—
Adelaide, 2 t. £24
**Borax**—
Boulogne, 5 pkgs. £15
Buenos Ayres, 4 cks. 32
Melbourne, 1 t. 32
**Bisulphide of Carbon**—
Antwerp, 7 t. 19 c. £93
**Bisulphite of Lime**—
Auckland, 6 cks. £19
**Citric Acid**—
Cadiz, 1 ck. £42
Toronto, 10 kegs 85
Dusseldorf, 2 17
New York, 1 t. 5 c. 220
Jersey, 1 ck. 15
Yokohama, 4 kgs. 34
New Orleans, 30 266
Antwerp, 7 c. 59
Rotterdam, 1 pkg. 9
Hamburg, 5 c. 44
Genoa, 1 t. 8 c. 230
**Caustic Potash**—
Melbourne, 5 t. 7 c. £99
**Caustic Soda**—
Hobart, 10 t. 7 c. £80
Melbourne, 10 9 79
**Chemicals** (*otherwise undescribed*)
Brisbane, 8 cs. £30
Mauritius, 272 pkgs. 12 brls. 100 kgs 238
Zanzibar, 50 dms. 53
Amsterdam 4 cs. 68
Calcutta, 24 cks. 110
Natal, 14 pkgs. 80
Charkow, 4 " 57
Oporto, 63 " 68
Valparaiso 115
**Corrosive Sublimate**—
Amsterdam, 7 cwt. £98
**Cream Tartar**—
Auckland, 1 t. £150
Melbourne, 10 c. 61
Dunedin, 10 70
Wellington, 2 cs. 19
Sydney, 20 cs. and 1 t. 263
Adelaide, 4 pkgs. and 5 c. 160
**Carbolic Acid**—
Rotterdam, 37 runlets & 24 cks. £475
Algoa Bay, 4 cks. 20
Shanghai, 31 pkgs. 45
**Copper Sulphate**—
Dunedin, 1 t. £24
Timaru, 1 23
Hamburg, 1 2 c. 24
**Disinfectants**—
Sydney, 4 t. 6 c. £63
St. Petersburg, 17 pkgs. 15
**Guano**—
Demerara, 16 t. £172
Lisbon, 4 t. 17 c. 39
**Insect Powder**—
Natal, 6 cwt. £55

**Iodide Potassium**—
Yokohama, 3 cs. £110
**Manure**—
Cape Town, 3 t. £22
St. Nazaire 14 18c. 45
Rotterdam, 44 9 203
Valencia, 522 3,930
Trinidad, 100 cks. & 66 t. 10 c. 1,282
Demerara, 13 t. 155
Antigua, 12 9 c. 130
Malaga, 17 170
Nakskov, 331 1,158
Barbadoes, 60 cks. & 100 t. 460
St. Lucia, 135 t. 1,015
Yokohama, 1 10 c. 195
St. Kitts, 14 17 156
Sydney, 10 40
**Nitric Acid**—
Jersey, 10 crbys. £18
**Pearl Ash**—
Melbourne, 2 t. 4 c. £35
**Potassium Chlorate**—
Hiogo, 5 t. & 50 kgs. £403
Cologne, 10 c. 25
**Phosphorus**—
Wellington, 2 cs. £14
**Soda Ash**—
Hobart, 5 t. £25
**Silicate of Soda**—
Hobart, 4 t. 12 c. £30
Melbourne, 10 10 65
**Salammoniac**—
Adelaide, 10 cwt. £19
**Soda Crystals**—
Brisbane, 25 t. £59
Dunedin, 113 cks. 40
**Sulphur (Flowers)**—
Cape Town, 525 pkgs. £400
**Sodium Bicarbonate**—
Dunedin, 1 t. £6
**Sheep Dip**—
Odessa, 5 t. £300
Amsterdam, 36 pkgs. 40
**Saltpetre**—
Melbourne, 2 t. £44
Lisbon, 1 9 c. 31
Almeira, 1 5 25
Oporto, 8 12 174
Rio Janeiro, 5 7 120
**Sodium Sulphate**—
Ghent, 50 tons. £50
**Sodium Bisulphite**—
Melbourne, 4 cks. £34
**Sulphuric Acid**—
Hong Kong, 9 cs. £34
**Sodium Acetate**—
Melbourne, 1 ton 5 cwt. £48
**Sulphur**—
Swan River, 2 tons. £15
**Tartaric Acid**—
Dunedin, 10 c. £90
Buenos Ayres, 10 85
Auckland, 3 cks. 27
Wellington, 5 cs. 45
Adelaide, 10 " 83
Cape Town, 3 pkgs. 25
Sydney, 5 kgs. 40

## LIVERPOOL.

*Week ending May 2nd.*

**Alum**—
Monte Video, 2 t. 10 c. £14
Montreal, 22 1 107
Leghorn 4 1 13

**Alum.**—*continued.*
Buenos Ayres, 2 t. 14 c. £13
Brisbane, 1 10 8
Bari, 2 11 12
Toronto 5 1 27
Syra 8 6 45
Volo 1 12 10
Passages 5 0 30
**Aluminous Cake**—
Montreal, 35 t. 9c. £126
**Ammonia Sulphate**—
Nantes, 5 t. £62
Ghent, 10 67
St. Nazaire 5 60
Valencia 153 8 c. 1,878
Antwerp 20 240
Bordeaux 8 4 c. 99
**Ammonia Liquid**—
Vera Cruz, 18 c. £15
**Ammonia Carbonate**—
Venice 15 c. £28
Pernambuco 10 21
**Alkali**—
New York, 50 t. 10 c. £255
**Acetic Acid**—
Messina, 4 t. 18 c. £82
**Arsenic Acid**—
New York, 8 t. 18 c. £83
**Ammonia Muriate**—
New York, 5 t. 5 c. £130
Havre, 1 2 23
**Arseniate Soda**—
Lisbon, 10 c. £5
**Acetate of Lime**—
Odessa, 12 t. £130
**Borax**—
Montreal, 6 t. 2 c. £185
Havana, 18 26
Malaga, 11 17
Valencia 4 6
Halifax, 4 2 q. 8
**Brimstone**—
Calcutta, 8 t. 1 c. £39
**Bauxite**—
Philadelphia, 5 t. 17 c. £17
**Bleaching Powder**—
Alicante, 40 pps.
Amsterdam, 4 cks.
Ancona, 13 "
Boston, 734 tcs. 838 cks.
Baltimore, 182 cks.
Corunna, 2 "
Genoa, 96 "
Havana, 4 pns.
Lisbon, 20 cks.
Naples, 17 "
New York, 48 "
Palermo, 19 "
Vera Cruz, 20 brls.
**Copper Sulphate**—
Lisbon, 2 t. 1 c. £41
Rouen, 2 19 50
Bordeaux, 30 7 152
Vera Cruz, 12 13 273
Marseilles 16 0 350
**Copperas**—
Lisbon, 7 t. 0 c. £13
Volo, 3 0 14
Syra, 3 2 7
Calcutta, 22 15 45
Montreal, 2 10 5
Galatz, 5 3 9
Madras, 7 0 14
Syria, 2 18 5
**Charcoal**—
Nantes, 68 t. 8 c. £280
New York, 14 2 55

**Charcoal Refuse**—
Nantes, 61 t. 2 c.
**Carbolic Acid**—
Genoa, 0 t. 11 c.
New York, 12 19
Rotterdam, 7 0
Montreal, 1 2
**Carbolic Fluid**—
Calcutta, 2 t. 5 c.
**Chromate Iron**—
Dunkirk, 2 t. 1 c.
**Chemicals** (*otherwise undesc*
Hamburg, 2 t. 2 c. 0 q.
Yokohama, 3 11 0
Antwerp, 0 11 0
Palermo, 0 14 2
Odessa, 6 2 0
**Carbon**—
Barcelona, 0 t. 1 c. 1 q.
New York, 2 5 0
**Caustic Soda**—
Adelaide, 3 pkgs.
Alexandria, 17 dms.
Algiers, 5 "
Amsterdam, 100 kgs.
Alicante, 25 dms.
Antwerp, 51 "
Brisbane, 20 "
Bahia, 20 "
Boston, 100 "
Barcelona, 75 brls. 20 cks. 264
Bari, 57 dms.
Buenos Ayres, 30 "
Bilbao, 5 cks.
Bombay, 200 dms.
Catania, 25 "
Canada, 971 "
Chicago, 57 bxs.
Corinth, 15 dms.
Corunna, 5 "
Dunkirk, 5 "
Fiume, 7 "
Galatz, 90 "
Genoa, 117 "
Ghent, 18 "
Gibraltar, 25 "
Hamburg, 773 "
Havana, 28 "
Ibrail, 85 "
Lima, 10 "
Leghorn, 30 "
Lisbon, 11 tcs. 20 brls.
Malaga, 20 dms.
Madrid, 50 "
Melbourne, 38 "
Messina, 10 "
Monte Video, 50 "
Montreal, 600 "
Naples, 10 "
New Orleans, 42 "
New York, 1,500 "
Oporto, 30 "
Palermo, 24 "
Philadelphia, 100 "
Rotterdam, 15 "
Rouen 83 "
San Sebastian, 30 "
SantaCatharina, 5 "
Seville, 80 "
Smyrna, 25 "
Sydney, 5 bxs. 12 brls. 50 dms.
Tarragona, 40 "
Valparaiso, 25 "
Valencia, 16 " 20 "
Vera Cruz, 30 dms.
Venice, 70 "
Yokohama, 55 "
**Disinfectant**—
Calcutta, 9 tons 4 cwt. £

) t. £1,083
**ibstitute—**
cwt. £22
–
) tons 14 cwt. £142
-
)ns 8 cwt. £50
50 t. 4 c. £188
9 11 46
85 11 80 bgs. 900
, 23 4 163
35 0 145
**Chloride—**
)ns. £9
–
)ns 19 cwt. £93
**id—**
)oys. £4
**:ash—**
) tons 5 cwt. £290
**Chlorate—**
t. 7 c. £195
0 374
10 466
0 53
0 107
10 128
15 37
**Bichromate—**
), 0 t. 16 c. 1 q. £34
10 16 0 330
0 4 0 12
's, 1 ton. £30
**is Acid—**
n 17 cwt. £25
**Soda—**
:wt. £25
**id—**
cwt. £25
**ac—**
t. 9 c. £17
4 135
16 32
:1 t. 10 c. £758
)0 2 40
**owers—**
tons 5 cwt. £36
.
0 c. £112
19 41
0 43
**ead—**
:ons 10 cwt. £57
—
, 5 cwt. £6
tons 9 cwt. £55
**arlo—**
1 cwt. £51
**Acid—**
)ys. £16
**hromate—**
tons 5 cwt. £161
-
48 cks.
30 tcs. 30 ,,
4 ,,
528 ,,
4 pps.
320 tcs. 900 bgs. 256 cks.
's, 150 brls.
57 cks.
)le, 50 brls.
5 cks.
12 ,,
14 ,,
65 dms.
tcs.
01 tcs. 237 cks.
, 214 tcs. 118 cks.
,0 kgs.
100 cks.
343 brls.
372 cks.
100 brls.
15 ,,
50 ,,
**tals—**
15 brls. 20 kgs.
110 ,,
50 ,, 12 cs.
150 ,,
100 ,, 100 kgs.
25 ,,
**ld.** 10 ,, 10 cks.
... 20 kgs.
200 bxs.
50 brls.
50 ,,

**Salt—**
Adelaide, 100 tons.
Amsterdam, 318 ,,
Antwerp, 494 ,,
Baltimore, 400 ,,
Banana, 290 ,,
Benin, 48 ,,
Bergen, 392 ,,
Boston, 500 ,,
Brisbane, 202 ,,
Buguma, 12 ,,
Buenos Ayres, 53 ,,
Cape Town, 30 ,,
Congo, 545 ,,
Calcutta, 8,286 ,,
Cameroons, 22 ,,
Canada, 1,029 ,,
Degama, 50 ,,
Dix Cove, 11 ,,
Ghent, 310 ,,
Grand Bassa, 17 ,,
Halifax, 3,380 ,,
Kingston, Jam., 15 ,,
Melbourne, 50 ,,
Montreal, 278 ,,
Newcastle, N.S.W., 150 ,,
New York, 2,279 ,,
Paspebiac, 370 ,,
Pictou, N.Z., 412 ,,
Quebec, 1,198 ,,
Rangoon, 2,185 ,,
Rotterdam, 73 ,,
St. John, N.B., 70 ,,
St. John's, Nfld., 5 ,,
Sierra Leone, 193 ,,
Sydney, 1,675 ,,
Trinidad, 71 ,,
Valparaiso, 118 ,,
**Sodium Bicarbonate—**
Adelaide, 100 kgs.
Ancona, 20 ,,
Bombay, 100 ,,
Boston, 100 cks.
Buenos Ayres, 20 kgs.
Calcutta, 700 ,,
Copenhagen, 150 ,,
Genoa, 100 ,,
Hamburg, 180 ,,
Gothenburg, 10 ,,
Leghorn, 14 ,,
Libau, 3 cks. 190 ,,
Lima, 2 ,,
Matanzas, 5 cks.
Montreal, 800 ,,
Naples, 40 ,,
Newcastle, N.S.W. 20 kgs.
Odessa, 100 kgs.
Palermo, 50 ,,
Quebec, 425 ,,
Rotterdam, 50 ,,
Sydney, 140 ,,
Yokohama, 1,000 ,, 50 tcs.
**Sodium Carbonate—**
Calcutta, 50 brls.
Catania, 40 kgs.
**Sodium Silicate—**
Barcelona, 30 cks.
Canada, 30 brls. 62 ,,
Constantinople 20 ,,
**Tartaric Acid—**
Montreal, 12 c. £104
Havana, 1 8
**Tartar Emetic—**
Vera Cruz, 6 cwt. £38
**Tin Crystals—**
Vera Cruz, 5 cwt. £23
**Tar—**
Trieste, 7 brls.
**Zinc Chloride—**
Bombay, 2 tons 14 cwt. £43

## GLASGOW.

*Week ending May 5th.*

**Alum, Lump—**
Calcutta, 32 t. 7 c. £163
Quebec, 16 5 65
**Ammonia—**
Buenos Ayres, 1 t. 10 c. £35
**Brimstone—**
Montreal, 10 t. 5 c. £62
**Bleaching Powder—**
Buenos Ayres, 7 t. 2 c. £54
**Charcoal, Ground—**
Christiania, 1 t. 6 c. £5
**Pitch—**
Konigsberg, 31 t.
Dantzic, 200
Sables d'Olonne, 720 £500
**Potassium Bichromate—**
Gothenburg, 5 t. 5 c. £209
**Paraffin Wax—**
Hong Kong, 1 t. 11 c. £34

**Soda Crystals—**
New York, 2 t. 5 c. £225
**Soda Ash—**
Buenos Ayres, 15 t. 5 c. £121
**Sodium Sulphate—**
Philadelphia, 49 t. 13 c. £110
**Sodium Bichromate—**
Rotterdam, 57 cks. £460
,, 30 320
**Sulphuric Acid—**
Colombo, 5 t. 10 c. £30
Madras, 7 17 39
**Tar—**
Konigsberg, 1,340 brls.
Dantzic, 250
Colombo, 3 t. 5 c. £23
,, 14 16 40

## HULL.

*Week ending May 1st.*

**Bone Size—**
Bremen, 20 cks.
Harlingen, 10
**Bleaching Powder—**
Konigsberg, 38 cks.
**Chemicals** *(otherwise undescribed)*
Antwerp, 23 cs. 20 pkgs.
Amsterdam, 45 cks.
Bremen, 2 8
Copenhagen, 6
Christiania, 5
Drontheim, 24
Gothenburg, 24 21 35 pkgs.
Hango, 177 slabs, 28
Hamburg, 147 cs. 17 40
Helsingfors, 25
Konigsberg, 20
Libau, 23 100
New York, 50 35
Rouen, 8
Rotterdam, 47 16 36
Stettin, 14
**Caustic Soda—**
Drontheim, 7 cks.
Hango, 10 dms.
Hamburg, 15
Konigsberg, 112
Libau, 186
**Creosote—**
Hamburg, 200 cks.
**Dyestuffs—**
Hamburg, 1 kg. 4 cs. 12 cks.
Rotterdam, 2
**Manure—**
Dunkirk, 1,317 bags.
Ghent, 472
Rotterdam, 191
**Naphtha—**
Hamburg, 1 brl.
**Pitch—**
Antwerp, 500 t.
**Tar—**
Copenhagen, 16 cks.
Hamburg, 8

## TYNE.

*Week ending May 5th.*

**Antimony—**
Barcelona, 12c. 2 q.
Quebec, 5t. 12 c.
**Alkali—**
Barcelona, 30 t. 19 c.
Gothenburg, 5 14
Hamburg, 17 6
Antwerp, 15 14
Bergen, 1 2
Quebec, 20 0
**Alumina Sulphate—**
Quebec, 10 t. 6 c.
**Alum Cake—**
Barcelona, 5 t. 12 c.
**Arsenic—**
Genoa, 1 t. 14 c.
**Alum—**
San Francisco, 21 t. 16 c.
**Bleaching Powder—**
Copenhagen, 35 t. 18 c.
San Francisco, 30 7
Rotterdam, 9 15
Gothenburg, 2 11
Malmo, 0 13
Christiania, 2 18
Hamburg, 73 7
Antwerp, 65 7
Dantzic, 64 0
Quebec, 20 14

**Barium Chloride—**
Genoa, 11. 13 c.
**Barium Sulphate—**
Genoa, 9 t. 19 c.
**Barytes—**
Quebec, 5 t. 5 c.
**Creosote—**
Copenhagen, 4 t. 1 c.
**Caustic Soda—**
San Francisco, 38 t. 15 c.
Hamburg, 8 15
Antwerp, 12 17
**Collodion—**
Hamburg 6 c.
**Ferromanganese—**
Bilbao, 93 t. 12 c.
**Litharge—**
Barcelona, 1 t. 2 c.
Antwerp, 2 2
**Magnesia—**
Barcelona, 5 t. 13 c.
Hamburg, 0 4
**Manure—**
Copenhagen, 19 t. 13 c.
Helsingborg, 16 13
Esbjerg, 12 16
Nakskov, 9 16
**Potassium Chlorate—**
Copenhagen, 1 t.
Rotterdam, 1
Antwerp, 10 c.
Genoa, 4
**Pitch—**
Malmo, 10 t.
Antwerp, 150
Quebec, 15
**Soda—**
Barcelona, 2 t. 2 c.
Copenhagen, 1 12
Kolding, 64 17
San Francisco, 107 3
Rotterdam, 51 14
Aarhuus, 6 0
Aalborg, 56 3
Esbjerg, 6 9
Korsor, 18 4
Dantzic, 5 2
Genoa, 70 19
Quebec, 142 15
Montreal, 227 10
Jersey, 1 0
**Soda Ash—**
Copenhagen, 10 t. 16 c.
San Francisco, 25 0
Rotterdam, 6 8
Aalborg, 4 16
Hamburg, 127 5
Dantzic, 53 11
Huelva, 6 9
**Sodium Bicarbonate—**
Aarhuus, 1 t.
Hamburg, 1
Antwerp, 1 2 c.
Dantzic, 1 5
**Sodium Bisulphite—**
Montreal, 100 lb.
**Sodium Chlorate—**
Rotterdam, t. c.
**Sodium Hyposulphite—**
Barcelona, 7 c.

## GOOLE.

*Week ending May 2nd.*

**Benzol—**
Antwerp, 50 cks.
**Chemicals** *(otherwise undescribed)*
Calais, 40 cks.
Rotterdam, 27 ,,
**Coal Products—**
Dunkirk, 101 cks.
Ghent, 37 dms.
**Manure—**
Bruges, 346 bags.
**Pitch—**
Antwerp, 350 tons.

## GRIMSBY.

*Week ending May 5th.*

**Chemicals** *(otherwise undescribed)*
Antwerp, 5 cks.
Hamburg, 14 ,,
Rotterdam, 6 ,,

# PRICES CURRENT.

[THURSDAY, May 10, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... per cwt. | 0 | 8 | 9 |
| ,, Glacial ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... per lb. | 0 | 0 | 6 |
| Fluoric ... ,, | 0 | 0 | 4 |
| Muriatic (Tower Salts), 30° Tw. ... per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... per lb. | 0 | 0 | 2¼ |
| Nitrous ... ,, | 0 | 0 | 2 |
| Oxalic ... ,, | 0 | 0 | 3 |
| Picric ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... per ton | 15 | 0 | 0 |
| ,, (monohydrate) ... ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ,, | 0 | 1 | 6 |
| Arsenic, white powdered ... per ton | 11 | 7 | 6 |
| Alum (loose lump) ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) .. ,, | 4 | 12 | 6 |
| Ammonia, ·880 = 28° ... per lb. | 0 | 0 | 3⅛ |
| ,, =24° ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ,, | 0 | 0 | 3⅛ |
| ,, Muriate ... per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... per ton. | 42 | 10 | 0 |
| ,, ,, (pure) ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 11 | 7 | 6 |
| ,, ,, (grey), Hull ... ,, | 11 | 5 | 0 |
| Aniline Oil (pure) ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ,, | 0 | 0 | 8½ |
| Antimony ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... per ton | 7 | 5 | 0 |
| ,, Carbonate (native) ... ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % ... ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ,, | 11 | 10 | 0 |
| Calcium Chloride ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... per lb. | 0 | 0 | 9 |
| Magenta ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ... per gallon | 0 | 2 | 11 |
| ,, 50/90 ,, ... ,, | 0 | 2 | 4 |
| Carbolic Acid (crystallised 35°) ... per lb. | 0 | 1 | 2 |
| ,, (crude 60°) ... per gallon | 0 | 3 | 11 |
| Creosote (ordinary) ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) ... ,, | 0 | 0 | 2⅛ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 0 |
| Grease Oils, 22° Tw. ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° ... per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... per ton | 80 | 0 | 0 |
| ,, Sulphate ... ,, | 21 | 0 | 0 |
| ,, Oxide (copper scales) ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ,, | 13 | 10 | 0 |
| ,, Litharge Flake (ex ship) ... ,, | 16 | 5 | 0 |
| ,, Acetate (white, ,, ) ... ,, | 25 | 15 | 0 |
| ,, ,, (brown, ,, ) ... ,, | 20 | 15 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 10 | 0 |
| ,, Nitrate ... ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) ... ,, | 8 | 10 | 0 |
| ,, ,, (grey) ... ,, | 13 | 0 | 0 |
| Magnesium (ribbon and wire) ... per oz. | 0 | 2 | 3 |
| ,, Chloride ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ,, | 17 | 10 | 0 |
| ,, Borate ... per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ... per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent ... ,, | 0 | 3 | 10 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 3 |
| **Oils:—** | | | |
| Castor ... per cwt. | 1 | 3 | 0 |
| Cotton-seed ... per ton | 22 | 0 | 0 |
| Linseed ... ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... per gallon | 0 | 0 | 6 |
| ,, American ... ,, | 0 | 0 | 6⅜ |
| Potassium (metal) ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... per lb. | 0 | 0 | 4¾ |
| ,, Carbonate, 90 % ... per cwt. | 0 | 16 | 6 |
| ,, Chlorate ... per lb. | 0 | 0 | 5¾ |
| ,, Cyanide, 98 % ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) ... per cwt. | 1 | 2 | 9 |
| ,, Permanganate ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... per lb. | 0 | 0 | 6¾ |
| ,, Sulphate, 90 % ... per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % ... ,, | 8 | 0 | 0 |
| Silver (metal) ... per oz. | 0 | 3 | 6⅜ |
| ,, Nitrate ... ,, | 0 | 2 | 7½ |
| Sodium (metal) ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % ... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % ... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % ... ,, | 3 | 17 | 6 |
| ,, ,, (Carb. Soda-ash) 58 % ... ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) ... ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ,, | 19 | 10 | 0 |
| ,, Chlorate ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... per ton. | 30 | 0 | 0 |
| ,, Bichromate ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) ... per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda) ... ,, | 7 | 7 | 6 |
| ,, ,, (70 % Caustic Soda) ... ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 12 | 6 |
| ,, Bicarbonate ... ,, | 5 | 0 | 0 |
| ,, Hyposulphite ... ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 ... ,, | 10 | 0 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | 6 |
| ,, Nitrite, 98% ... per ton | 28 | 0 | 0 |
| ,, Phosphate ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 5 | 0 |
| ,, Sulphate (Salt-cake) ... ,, | 1 | 1 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 10 | 0 |
| ,, Sulphide ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... per cwt. | 0 | 13 | 3 |
| ,, Cane ... ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium ... per lb. | 0 | 0 | 7¾ |
| ,, Barium ... ,, | 0 | 0 | 5 |
| ,, Copper, 60% ... ,, | 0 | 0 | 8½ |
| Sulphur (Flowers) ... per ton | 8 | 15 | 0 |
| ,, (Roll Brimstone) ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) ... ,, | 2 | 5 | 0 |
| Tallow ... ,, | 26 | 0 | 0 |
| Tin (metal) ... ,, | 80 | 0 | 0 |
| ,, Crystals ... per lb. | 0 | 0 | 7 |
| Zinc (Spelter) ... per ton | 17 | 15 | 0 |
| ,, Chloride (solution, 96° Tw.) ... ,, | 5 | 12 | 6 |

# Chemical Trade Journal,

, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, May 19, 1888.**


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## THE PATENT LAWS.

IN the remarks we have already made on pp. 33, 209, and 225, upon the bearing of our patent laws upon the chemical industries of this country, we have said quite enough to set many interested persons athinking. On page 34 we urged the point that many patents are taken out by foreigners, resident abroad, who simply hold those patents in order to prevent anyone working the process in this country. We also argued on page 209 that three things were necessary in connection with patent litigation—first, the absolute necessity of a fuller investigation into the merits of a new process before the complete specification is lodged, and the details of what we recommended upon this subject may be found on page 225; secondly, the necessity for a revision of our patent law; and thirdly, the absurdity of taking cases involving the calling of expert evidence into an ordinary court of law.

On page 274 we called attention to the fact that Mr. Ritchie had informed Sir Henry Roscoe, in his place in the House of Commons, that the Government intended to introduce a bill amending the Patent Act in some minor particulars; it is therefore an opportune moment to put before the thinking portion of the chemical trade our views upon this matter, and so take up the second portion of our parable, the necessity for patent law revision.

Some manufacturers, no doubt, who have not thought very deeply upon the matter, and to whom patents have not been of any great moment, may say, Why, the patent laws have only just been revised; why in the name of fortune should they be disturbed again? We reply: for the simple reason that they operate unfairly between patentee and patentee, they give advantages to the foreigner to the manifest disadvantage of our capitalists and our workmen by being a restraint to trade, and instead of encouraging and fostering native industries, our patent laws actually prevent certain trades settling here, and drive them away to other shores. Rather than that things should continue as they are, it would be better if our patent laws were swept away altogether. In thus expressing our sentiments we do so from having viewed the subject from several standpoints. As patentees, we have fully ascertained the defects of the present system; as negotiators of patents for others we have also discovered the weak points in this connection, while engagements as expert in courts of law has not made us regard the last Patent Act with any great amount of favour.

Nevertheless, the last Patent Act has been a great improvement on previous ones, though it is open to question whether the administration of the patent office is carried out in the best manner.

In our opinion two very radical changes require to be made in the Act. First, we see no reason why, except from the circumlocution office point of view, the process of provisional protection should be retained. We would be inclined to make everyone desirous of the grant of a monopoly state in very clear and definite language what he really desired that monopoly for. We would wish to see the filing of the complete specification the first and final process, and the whole country would benefit by the change.

At first sight it would appear that nine months' provisional protection would be a great benefit to the patentee by giving him time to work out his invention after its first appearance in the ideal stage. This ideal stage is one that we desire to see suppressed. A man has no right to the grant of a monopoly for a process, only as yet, in the clouds, and from the many specifications we have examined we have come to the conclusion that, as a rule, patentees simply copy the provisional specification for their final document, but adding

their claims, which they might just as easily have done in the provisional. As patentees ourselves, we should not consider the abolition of provisional protection as any hardship, but quite the reverse. Dissentients with this view, and no doubt there are some, will, of course, say, "But you can under the existing law file a complete specification as the first or initial step." This is true, but in so doing the specification is open to inspection long before those filed earlier as provisionals, and these patentees can get a sight of the later dated complete before they have to file their own, and can, consequently, mould their claims accordingly. It is on this account that so few commence the process by filing a complete specification.

The second radical change we desire to see effected is in the granting of British patents to residents in foreign countries. We take it for granted that the British Patent Laws are for the benefit of Her Majesty's subjects in the British Isles. There are two or three classes of individuals to be considered in this connection—1st, the patentee; 2nd, the worker of the invention, if there be one; and 3rd, the public. Now the Patent Laws should not be entirely in favour of the patentee. If the patentee is the user of the invention, then the public has a right to demand protection; but if the patentee is not the worker or user, it is pretty certain that he will endeavour to license as many users as he conveniently is able, and the public will find no reason for interference, as competition will most assuredly keep prices reasonable. Of course there are exceptions to the rule, and it will not be a difficult matter to bring some of these to the front in order to contradict the logic of our arguments, but for every one so brought forward it would not be difficult to find ten pointing to opposite conclusions.

It is the foreign resident, the possessor of patents in this country, which are not worked here but abroad, who requires to be looked after most carefully, and we believe it only requires the attention of the Legislature drawn to the question in order to amend a very iniquitous state of things. Our readers may say, "Yes, all this is very well, but how are we to help ourselves? We know the disastrous effect of this clause of the Act, but what can we do?" In reply we say, Agitate! and when all has been done that can possibly be done in that direction, agitate again. There is no reason why a patent should be granted to anyone who simply holds it for the purpose of locking it up, and so preventing others from working it, and that this is the spirit upon which the last Act was framed, may be seen by reference to the compulsory license clauses. But these clauses are a dead letter, and must always remain so on account of the expensive machinery of the law.

In conclusion, we simply desire to bring these matters before the notice of those who are more interested in the question than ourselves, in the hope that the barriers which now obstruct our progress and our national reputation may at once be broken down.

## CHEMICAL ENGINEERING.*

### I. INTRODUCTION.

IN these days of progress and of unwearying devotion to the never-ending developments of the processes incidental to the promotion of trade and commerce it has been found necessary to subdivide our labour. And not only has manual labour been divided into sections, in order to render work more easy of execution and therefore more cheaply produced, but the theoretical element has had to follow suit, so that the man who merely professes a general smattering of popular science—though quite enough in days gone by to have made a reputation—is no longer considered an oracle, and his opinions are now-a-days of but little value.

In the scientific world we have only to turn our eyes to the profession of the engineer to see how all-important a subdivision of our work has become. Students of this profession, although commencing with one common training, have in after years found themselves in very various callings, so that now the application of engineering science to the various industries has resulted in the formation of sub-families, so to speak, in which we may find civil engineers, mechanical engineers, electrical engineers, water engineers, sanitary engineers, gas engineers, and no doubt others.

I have omitted a name from the foregoing list advisedly, and now allude to the profession of the chemical engineer. By this term I do not wish to infer that all those who undertake to erect chemical plant should be considered in this category. If they carry on their business on scientific principles then there should be no objection to their use of the term; but in the lectures which follow, I would desire to draw a very clear line of demarcation between the chemical contractor and the chemical engineer. I do not wish to say anything against the undoubted abilities of the contractor in this connection, but to point out that he should stand to the chemical engineer in the same position as the builder stands to the architect, or the constructor of ironwork to the civil engineer.

The fact is, that the profession of the chemical engineer has never been sufficiently recognised by the chemical industries, or rather by those who have their money invested in them, and as a consequence it has been neglected. Chemical engineering does not consist in merely being acquainted with the chemical properties of the various substances to be operated upon by chemical means. If this were all, chemical manufacturing would be a very easy task, but it is the physical side of the question that requires the most attention paid to it just now, in order to keep in advance of those foreign nations who are straining every nerve to compete with us, not only in foreign markets but also in our own.

I well remember a meeting in this city of twenty-four manufacturers of South Lancashire in the year 1880, in a room not a mile from where we now are. It was one of the preliminary meetings of the Society of Chemical Industry. At first, however, it was not intended to form such a society, but one which was called in the original circulars "A Society of Chemical Engineers." After much discussion this name was adopted by the provisional committee; but immediately after the vote was taken, when sitting as secretary to that meeting, I heard a very well-known manufacturer say to his neighbour "I did not know before that there was an animal of that genus in existence; I have heard of civil engineers, electrical engineers, etc., but never of a chemical engineer."

This is indicative of knowledge in 1880 relating to this subject, and I have but little doubt that there are to-day very many chemical manufacturers without a true idea of the knowledge and duties of the chemical engineer. In brief, I should define a chemical engineer as an individual possessing a knowledge of chemistry, physics, and engineering, and also applies this knowledge in the utilisation of chemical action on a manufacturing scale.

It is common enough in the chemical industries to hear the expression "Science and practice will never work together." Now, having heard this myself for the greater part of two decades, I have no hesitation in saying it is a gross libel on science; but I do nevertheless hesitate in pronouncing the expression a greater libel on science than on careful practice. And this brings me to a point where I would fain say a few words on the subject of technical education, seeing that it has largely been brought so prominently before the country in a variety of ways. I may have peculiar views upon this subject, but it is a matter I have thought and talked over for many years, and my opinions are strengthened as years roll on.

Beyond the materials necessary in any chemical industry (and in fact in any other) there is labour and thought required, and it is the successful combination of these two that makes a prosperous business. The man of thought often learns much from the man of labour, and the man of labour should therefore be just as much encouraged as the man of thought, and his life made easy and comfortable for him.

Until we have succeeded in totally eradicating laborious work, executing the same with thews of iron and steel, for which event we may vainly wait for ever and a day, it seems to me to be our bounden duty, and our first duty, to look after the sanitary and social welfare of the muscle producing class, to make their homes more alluring to them, so that the younger members of the family who prefer to combine

* A lecture delivered by Mr. George E. Davis at the Manchester Technical School.—*All rights reserved.*

brain-work with muscle-combustion may be able to study at home in the evening, a thing absolutely impossible in nine-tenths of the houses it has been my lot to encounter in several of the chemical districts. Strong and healthy men are as requisite in the chemical industry as in an army; and it is the height of absurdity to talk of expecting a man to study the theory of his work on his return home at night after twelve hours of bodily labour and fatigue. And on the other hand, we may inquire whether it is necessary that the manual labourer should be educated technically in the art and mystery of all he is required to do, and for my part I say decidedly No! as before doing this it would be far more rational to teach him languages so that he might correspond and converse with his neighbours, the laws of health so that he may be able to keep his body in good working order and do his duty to himself, and after this is done let him inquire, if he has the inclination, into the principles of the various processes he has daily to manipulate. Amongst men of middle age I have met with but few of such inquirers, the aptitude for study residing in younger men, and therefore I feel that it is quite necessary to deal with technical education on the lines that it is of primary importance only to those who have charge of processes, or who seek to hold such positions in the future.

It may be assumed that the study of modern economics leads us to the conclusion that the position of the manual labourer, and of the steam engine and its appurtenances are interchangeable; the one consumes food and gives power in return, while the other in yielding power consumes the cheaper article coal, so that the manual labourer can never hope to compete successfully with a machine consuming only four pounds of coal per hour when yielding power equivalent to that of eight men; but even this is put into the shade by the performances of the Hargreaves' thermo-motor, which is capable of giving power equal to that exerted by one hundred and sixty men over the space of one hour for a penny; or in other words, in order to compete, a workman's wages would not have to exceed one-third of a penny per week.

You will think perhaps that I have sufficiently digressed from my subject. I have done so intentionally. I wished to draw attention to the fact that where power alone was required—brute force if you like so to call it—the human machine is not in the running; but there are some operations in which manual labour is almost necessary on account of the certain amount of technical skill which is mixed up with the labour question. Here is a field for technical education proper; but it is a question for discussion whether the technical information should be given to the labourer or to those in charge so to speak of the process; I think the latter. The labourer is the equivalent of the engine. You instruct your engine as much as you can by means of automatic appliances, but there is a point beyond which you cannot go. A machine cannot be made to think, and therefore if skilled labour is required a certain amount of scientific information must be infused into the man who has to superintend it, and who thus become raised from the level of a machine and occupies a more thoughtful position, and the more we can employ the heat engine to raise the foot-pounds, so leaving the human engine free for higher aims, the more successful will our manufactures become, and at the same time the better shall we be able to stand against foreign competition.

I should like to say a few words respecting this subject also, but must refrain; it is so large a field, and raises so many side issues, that discussion would be out of the question. My own impression is that England has no enemies save amongst her own people, and that we cannot expect anything else than foreign competition while Government departments exists which put all possible hindrances in the way of trade; while our Patent Laws prevent industries settling here, and even send them away to foreign shores; where our laws allow immense permanent burdens to be laid on the shoulders of new enterprises, such as in the case of our Ship Canal; where our railway rates give every preference to the foreigner, and where the bread and cheese engine will strike rather than be fed; but I hope the time is not very far distant when our workmen shall have learnt obedience to instructions, which doubtless goes far to enable Germany to compete with us, and which no doubt is the outcome of the military discipline in which all Germany is trained.

I believe myself that England possesses quite as many men of thorough technical education as she needs; they only require to be tempted from their seclusion, and I certainly do declaim against those public men who go running from Dan to Beersheba exclaiming that all is barren.

All these remarks only go to show that in manufacturing chemistry we should endeavour to do the rough work—the the work I have previously described as raising the foot pounds—by means of machinery; the days of old tubs with an agitator fixed to the bread and cheese engine have well nigh ebbed out, and it behoves every one interested in the utilisation of chemical action on the large scale to see that those reactions are carried out as perfectly and as cheaply as possible.

Here is the science of chemical engineering in a nutshell. In England raw materials have been abundant and cheap, and climatic conditions have been in our favour; until quite recently profits have been large. We have been as the hare lying down to sleep with the plodding tortoise behind us, but having awakened in time there should be no doubt as to the result of the race.

The necessity of a knowledge of chemical engineering manifests itself to us directly we endeavour to utilise chemical action on a large scale. Minerals form a very large proportion of the raw materials used in chemical operations, and as received from the mines they are often in large masses. Now suppose these masses to be copper pyrites, intended for use in the manufacture of oil of vitriol, being burned for the purpose in kilns of simple construction. I have known some manufacturers so ignorant of the conditions required in chemical action that they have charged, and do still charge, the ore into the kilns in the exact state it is unloaded from the vessel in which it is shipped. Of course chemistry tells us that the more finely divided a mineral is, the easier its decomposition is brought about, and the same may be said with regard to regularity of size with respect to the particles themselves. On the other hand, chemical engineering tells us that certain physical conditions must be observed. In undergoing combustion a mass of copper pyrites, like any other combustible material, must be open enough to allow the passage of a current of air, so that it comes about that pyrites in large pieces has to be dealt with in a different manner to that which occurs in fine powder. I have chosen this as an illustration of the operation of pulverisation, which at one time was performed entirely by manual labour, until engineers took the subject in hand and produced what are now called stone-crushers or stone-breakers.

These machines, which will be fully described when treating of the preparation of solids, may now be seen in every works where any considerable quantity of minerals have to be operated upon, and a visit to the limestone quarries of Buxton will show how completely the human engine has been superseded, and how exactly the separation of the pulverised mineral into various qualities is effected.

The physical differences of various mineral substances render a careful study of even a simple subject like pulverisation necessary. A manganese ore could not be treated in the same manner as china-clay, neither could a guano be worked similarly to a native phosphate such as apatite. The subject of grinding flints would for a time be a puzzling one for the tyro to whom the operation was new. In connection with minerals we have the operations of calcination and fusion, such as with certain qualities of iron ore and copper ore; but the apparatus in which these operations are conducted will be made the subject of another lecture.

In the liquid form, most of the reagents used in chemical action are better under control, and the forces of heat, cold, electricity, and motion are more easily applied than when in the solid form. But it is the liquid state which frequently calls forth all the energies of the chemical engineer, and requires an amount of knowledge only gained by long practical experience. The subjects here to study are the moving, mixing, and storing of large quantities of liquid, often of a very corrosive nature. And indeed if the fluid is not corrosive, it may possess the quality of volatility, of inflammability, or spontaneous decomposition, all of which must be taken into consideration in dealing with such substances.

Then, again, when a liquid is made to react upon a solid, not only has the physical condition of both to be considered, but there are many details to be settled quite unknown to those whose *forte* is pure laboratory practice. It will be found that the success of these operations depends upon attention to details, and these details, when carried out on a manufacturing scale, are of quite a different character to laboratory practice.

In the various operations wherein raw materials are employed, such as solution, crystallisation, precipitation, subsidence, and filtration, there is a field for much invention, but that invention must run between clear and well defined lines. Much invention appears in the chemical world from a desire to effect the same object as some one else has arrived at by different means without considering whether the new process is less expensive or better in any way than the old. This may be useful in its way, but it is not the kind of invention it is desirable to encourage.

Evaporation and distillation are processes dealing with liquids, which form the raw materials of certain industries, notable, the spirit distillers and the tar distillers. The physical condition of the raw materials in these cases do not call for special attention here, though a mass of interesting information has been put together for special treatment when that stage is arrived at in a future lecture. But the newspapers tell us how carefully these operations should be carried on, and with well-constructed apparatus. Only a few weeks ago an explosion took place at a whisky distillery, and several explosions of tar-stills have taken place in the neighbourhood of Manchester, showing the necessity of a careful study of the construction of the apparatus.

And now having set out the necessity of a careful study of the physical condition of the raw materials, in order to apply the apparatus to the various reactions in a proper manner, we arrive at another problem of equal importance—viz., that of preparing the finished articles in a certain physical condition in order to secure a ready sale.

At first sight this will not appear a difficult problem, but I will venture to say that there is no subject beset with so many difficulties in the whole range of chemical manufacturing.

There is nothing so vexatious, when you know that the engineering and chemical reactions are both theoretically and practically perfect, as to find that the finished article varies in its appearance. The fault lies here in the very minutiæ of detail, such as, for instance, a want of cleanliness, or a few degrees higher or lower of temperature.

It is amongst the finer chemicals that the eye has to be pleased, and the merchantable quality of a chemical product often depends, not so much upon an absolutely pure condition, as upon a certain physical form, which may perhaps have been handed down in some old-established firm through several generations. Then, again, there are such substances as salammoniac; as chloride of ammonium it is known to the theoretical chemist, and though chemically identical with the former compound, the latter could not be given if the former was asked for.

In supplying the market with many articles their physical condition often determines whether they meet with a successful introduction. I well remember when the ammonia-soda was first introduced to the notice of bleachers and paper-makers in this country. Chemically it was the same as a very good sample of refined alkali, but physically it was different, it was not so dense, and consequently the expense of packing into barrels was greater, and many users of it stated they could not get through so much work as when using other kinds.

All this has now been overcome by the aid of chemical engineering. Then again in the chlorate of potash trade, as most of you are no doubt aware, a very large quantity is used by dyers and calico-printers, but a very large quantity is consumed also by match-makers. Now some of you no doubt have observed that certain wax vestas do not ignite the instant they are rubbed on a rough surface, they hesitate to ignite, and on this account are dangerous. This comes about not by any chemical impurity, but by reason of the salt not being so finely divided as it should be. I could mention to you many instances where physical condition is all important in order that certain articles may find a ready sale, but perhaps the few cases already cited may prove sufficient for the present. It may be urged that it requires but little engineering to solve the problems already quoted, but I have advisedly given you two simple instances, so simple, indeed, that, had they not occurred in actual practice to militate against the manufactures mentioned, I should not have thought of bringing them forward now.

In the manufacture of articles of food the effort to please the eye is very carefully cultivated. It would not do for Mr. Brown's sugar to look worse or any less pleasing than Mr. Green's; they may both contain 99·9 per cent. of sugar, but the one that looks the best will find the readiest sale. This may be said of almost all articles of food, and the demand for good looks is now running through all branches of the chemical and allied trades.

Regularity of physical condition is a great point, and although manual labour may be trained to very delicate work, yet that delicacy becomes much more expensive than production by machinery. The regularity of a machine has become proverbial, and when a well-constructed machine becomes irregular in the quality of its output, it is because those in charge of it have neglected it. I have already told you we cannot make a machine to think; we provide a superintendent to do the thinking, and it is this individual who should be instructed in the why and wherefore of the machine's action.

I would now desire to draw your thoughts into another direction, and to ask you to listen to me while I tell you of the importance of laboratory experiment. By this I do not mean mere analysis, but I allude to the carrying out of all new processes on a small manufacturing scale before much capital is expended in the works themselves. I hope I shall live to see an experimental laboratory forming an integral portion of every well-ordered works, fitted up with mixers, power, filter-presses, steam, stills and miniature furnaces heated by gas, so that weighed quantities of substances may be operated upon in larger quantities than in mere laboratory experiments, and a much more correct opinion formed therefrom.

I hold that such a system, such an experimental laboratory, in charge of a good technical chemist, would prove far more remunerative in the long run than trying the experiments on the large scale, and making what alterations may be found necessary after the plant has been fully erected.

I have had ample opportunity of forming a correct judgment on this matter, and were it not *infra. dig.* I could tell you of the many thousands of pounds I have seen wasted when acting as Government Inspector of Chemical Works. I am sure that such waste is not good for the trade of the country, and though, as some may argue, it brings experience, yet that experience is dearly purchased if it results in the destruction of good and useful material as I have often seen.

An experiment carried out in a well-fitted laboratory, taking an ordinary case, say with one kilogramme of raw material, or to produce one kilo. of the finished article, might be very satisfactorily carried through without much expense. Small filter-presses are now made in Germany for dealing with these small quantities; stills, extracting apparatus, mixers, centrifugal machines, dynamos, electro-motors, and furnaces may easily be constructed to match, while power can readily be obtained from an electro-motor, turbine, or a gas engine, or, where there is no gas, from a petroleum engine. Germany is well provided with all these things.

*(To be continued.)*

# Parliamentary Jottings.

RIVER WEAVER TRUST.

In reply to Mr. Brunner, Sir M. Hicks-Beach said: The history of the Weaver Trust is contained in a report presented in 1872 by the Board of Trade on the Weaver Navigation Bill, then before Parliament. The Board of Trade have no power to alter the management of this or any other river in the kingdom, and any proposal for a reconstitution of the trust must come from those interested. Any such proposal would receive the best consideration of the department.

POISONING INDIANS IN BRAZIL.

Mr. Stephens asked the Under Secretary of State for Foreign Affairs whether the attention of Her Majesty's Government had been called to a communication which appeared in the *Times* of 21st April, describing the poisoning of a village of 3,000 Indians and a village of 800 Indians by strychnine and chloride of mercury in Brazil, the same communication further declaring that it is in contemplation to destroy another village of 5,000 Indians by the treacherous use of poison in a similar way; and whether, as a reference is made to some connection, in a manner not explained, with the idea of missionary work, the Government will communicate with the Brazilian Government upon the ground of the interest and anxiety which we share with the Brazilian nation in whatever affects the honour of Christianity.—Sir James Fergusson said that Her Majesty's Government could not believe that such atrocities had been committed under a civilised and Christian Government, and hoped that if there had been any such occurrences their extent had been greatly

exaggerated, and that their authors had been visited with just punishment. But it was not the duty of Her Majesty's Government to question a foreign Government with regard to affairs entirely domestic. No Government could be insensible to the public opinion of the world, and to the detestation which would attend such acts if tolerated.

LIMITED LIABILITY COMPANIES.

Mr. Pickersgill asked the First Lord of the Treasury whether he was aware that the aggregate of the capitals of companies registered between January 2 and April 17 of the present year amounted to £99,403,657; whether his attention had been drawn to an article in the *Statist* newspaper, in which it was declared that "the public are being fleeced right and left;" and when the Government intended to introduce the Bill promised in the gracious Speech from the Throne "for remedying abuses in the formation of companies under limited liability."—Mr. W. H. Smith: The nominal capital of companies registered between the 1st of January and the 17th of April, 1888, reaches a figure of £100,206,857, while during the same period of last year the figure was £40,525,266 only. The difference is believed to be caused by the desire to escape payment of the stamp duty of 2s. per cent. on the nominal capital of companies which will be exigible as soon as the Budget Bill becomes law. I am aware that the *Statist* has for some time been calling attention to the working, etc., of a certain class of company, but I have no information as to whether the deductions drawn by the *Statist* are correct. With regard to the introduction of the Limited Liability Bill into the House of Lords, I am unable to add anything to the answer I gave on the 17th inst., viz., that it would be introduced as soon as possible.

CROSSNESS SEWAGE OUTFALL.

In answer to Mr. Bradlaugh, Mr. Alan Egerton said: In answer to the hon. member's question, I have to state that the Board did on Friday last accept a tender for some large works at the Crossness Sewage Outfall, the works being mainly for the purpose of purifying the sewage by precipitation of the solid matter, and including also an enlargement of the sewage reservoir, which has for some years past been of too limited capacity, thus necessitating the occasional discharge of sewage into the river before the tide has begun to ebb. The Board's consulting chemist has reported that the use of chemicals will not prevent a foul condition of the river in droughts or during hot weather, but in thus speaking he refers to the application of chemicals to crude sewage, as has been the case during the last two or three summers, it not having yet been possible to put into operation the process of separating the solid matter from the whole of the sewage. The proposed works can hardly be said to be opposed to the recommendations of the Royal Commission, inasmuch as the Commission contemplated as one alternative the discharge of the separated liquid at the present outfalls after it had been purified by filtration through land. Therefore, whatever method of purification may be finally adopted, the precipitation works and the enlargement of the reservoir now resolved upon are not opposed to the recommendations of the Royal Commission. The Board does not take the view that the circumstance of a Local Government Bill being now before Parliament relieves the Board from the duty which devolves upon it, and which, moreover, has so frequently been urged upon it by the Government, of preventing the pollution of the river Thames by the discharge of crude sewage.

THE LAW OF LIMITED LIABILITY.

Mr. Hoyle asked the First Lord of the Treasury if he could now state when the bill promised by the Government for the amendment of the Law of Limited Liability would be introduced in the House of Lords.—Mr. W. H. Smith: I am unable to say when the Bill will be introduced, but it is in a forward state.

MERCHANDISE MARKS ACT.

In answer to Mr. Schwann, Sir M. Hicks-Beach said: No samples of goods detained under the Merchandise Marks Act have been forwarded by the Custom House authorities to the Board of Trade. It may be that the Local Government Board authorities forwarded samples to the Local Government Board in London, but that, of course, has nothing to do with the Board of Trade.

AMERICAN ZOLLVEREIN.

Mr. Schwann asked the Under-Secretary of State for Foreign Affairs whether his attention had been drawn to an Exchange Company's telegram of the 26th of April, dated Ottawa, April 26th, to the following effect:—"That the Republics of Central and South America, Hayti, San Domingo, and the Brazilian Empire, have decided to send delegates to Washington next April to attend a Convention having for its object the promotion of an American Zollverein or Customs Union, to the exclusion of the goods of other countries;" and whether there was any truth in the statement; and, if so, whether Her Majesty's representatives in the Southern and Central American States had been requested to point out to the Governments to which they were accredited that in joining such a Customs Union, to the exclusion of the competition of other manufacturing countries other than the United States, they would act detrimentally to the interests of the trade of this country.—Sir J. Fergusson: Her Majesty's Government were informed in 1886 that such a scheme was spoken of, and inquiries were made in America about it. It assumed no definite shape and we have received no recent information on the subject. Inquiries will now be made regarding it. I am afraid that if the scheme should be seriously contemplated, the Governments concerned will consider their national interests rather than those of British commerce.

THE WRITING TELEGRAPH.

Mr. M'Ewan asked the Postmaster-General if his refusal to grant a licence to the proprietors of the writing telegraph was indicative of a resolution to depart from the position taken up by the Government as defined by Sir Henry James (then Attorney-General) on November 29th, 1880, in the case of the "Attorney-General *v.* The Edison Telephone Company (and others)" now United Telephone Company (specially reported for the *Telegraphic Journal*, December 15, see vol. 8, page 425), as follows:—"There is no desire on the part of the Crown to check invention. I most emphatically disclaim that. Inventors and companies will always be dealt with in a liberal spirit if they consent to become licencees of the Crown;" and further, in the same case, the Attorney-General said (see *Engineering*, vol. 30, page 514), "The Government has no wish whatever to stop energy for increased knowledge in telegraphy, the sole object of the Crown on the present occasion being to obtain an order for a compulsory licence upon all persons who should use the telephone;" and if that action did not arise in consequence of the telephone company having refused to become licencees; whether his attention had been called to the statement of the Attorney-General, on his application to two Judges of the High Court on April 11, 1881, to vary the decree (see *Telegraphic Journal*, vol. 9, page 149, "The litigation has now come to an end. When once the claim of the Crown to the monopoly was admitted, they would be ready, in the interests of the public, to grant licences, so that there might be no impediment in the way of the active carrying on of the telephonic communication;" whether, seeing that the proprietors of the writing telegraph only asked to become licencees of the Crown, he would state on what grounds they were refused to use their telegraph system; and had he discretionary power to alter the principle on which Government had declared its intention to deal with inventors and companies as in the Edison case.—Mr. Raikes said: In reply to the hon. member, I have to say that the declaration which his question gives in the first person is not a quotation from the report in the *Telegraphic Journal* of December 15, 1880. That report is a condensed account of the proceedings, and is given in a narrative form in the third person. The report in *Engineering* is also a mere condensed account. I can cite nothing in the shorthand writer's notes which conveys such an impression as the hon. member has received. I may further say that the then Postmaster-General did not, on the judgment being given in his favour, immediately concede a general licence even to those who were parties to the case before the Court. He freely exercised his discretion, refusing a licence here, and granting a licence there. I have on a previous occasion stated to the hon. member that the Government has never assumed the position of granting indiscriminately a licence to every inventor of a new form of apparatus. I have also informed him that if there is a substantial demand for the establishment of exchanges to be worked by the instruments of the Writing Telegraph Company, I think it preferable that they should be in the hands of the Post Office, the instruments being supplied by the proprietors on terms to be arranged. To both these statements I still adhere.

TOBACCO JUDGING.—Mr. G. H. Ball, of Parry and Crosby, tobacco brokers, Liverpool, has been appointed one of the judges in the prize competition for home grown tobacco, promoted by the London Chamber of Commerce. The judges meet in London on Monday next.

# Trade Notes.

Manganate of Soda.—Messrs. Tennant, Sons, and Co.'s tender has been accepted for the supply to the Metropolitan Board of Works of 2,000 tons of manganate soda, viz., 500 tons for £6 15s. per ton, and 1,500 tons for £6 17s. per ton. Messrs. Mort, Liddell, and Co.'s price was, for 400 tons, delivered 20 tons weekly, £7 3s. 9d. per ton.

A Sweet Example of Red Tapeism.—"Will you mention the case of the filter?" said Mr. Raikes to Sir Arthur Blackwood, the permanent secretary of the post-office, who was being examined by the select committee on the Revenue Department estimates. The case of the filter was as pretty a piece of red tape business as was ever burlesqued in fiction. The post-office, though a large commercial business, has it seems no control over its own buildings, repairs, and furnishings; so when a filter was required for the use of a staff of eight clerks in a small provincial office, the Office of Works had to be requisitioned. The Office of Works referred the subject to a district surveyor, who graciously reported in favour of the filter, but recommended that it should be placed, not in the office, but in the corridor. The local postmaster thought he knew his own requirements best, and submitted to his department, as the Office of Works surveyor had submitted the contrary to his, that the filter was useless in the corridor, while it was wanted in the room. A filter controversy was thus fairly established between the two departments, and nineteen references backwards and forwards between them had taken place before the local post-office was allowed to have its filter where it was wanted.

The Lost Chord.—If it had not been brought before a Select Committee it would have been scarcely possible to have credited a story as to red tapeism just told. It is to the effect that a cord of a Venetian blind broke in one of the rooms of a London post-office. The postmaster has no authority to effect repairs; so he reported the fact to the Office of Works. A surveyor appeared in due course to report on the damage. And finally a cart, two men, and a boy appeared—and this staff "proved equal as a remedy for the broken cord." This is red-cordism with a vengeance.

Smoke Prevention.—Under the title of The Gaseous and Liquid Fuel Supply Company Limited, a company has just been registered to take over the patents of Mr. B. H. Thwaite, C.E., F.C.S., of Liverpool, for generating water-gas, and other descriptions of gaseous fuel, for gas motors, gas furnaces, and for heating purposes generally, and for the application of Mr. Thwaite's patents for heating and lighting with liquid hydrocarbons. The company will establish a fuel-testing laboratory and act as guarantors against smoke-nuisance fines. It will be seen that the objects of the company in effecting fuel economy and preventing smoke are likely to be a public advantage.

Fall in Staffordshire Iron Prices.—A sharp fall has occurred in Staffordshire iron prices. Galvanised sheets, which in January were £12 10s. to £13, London, have dropped 30s. to 40s., the present price being £11. A heavy drop in spelter is the main cause. The former maximum of £22 10s. has fallen to £17. Black sheets have declined 7s. 6d., namely from £6 10s. for twenty-four gauge, to £6 2s. 6d. Singles have fallen to £5 15s. Common bars, hoops, and strips have lost nearly 5s.

Genius.—First Yankee: "What puts you in such a good humour this morning?" Second Yankee: "I've just got a patent for my new patent ink eraser. I wouldn't take $50,000 for it." "Did you get a patent last year for inventing an indelible ink?" "I did, and I sold it for $30,000, and now I've invented an eraser that will even remove writing done with my own indelible ink." "What are you going at next?" "I'm going to invent another indelible ink that can't be erased with my new ink eraser. I tell you, there is money in this patent business if you go at it right."

English and French Fuel.—A statement in the report of our Consul on trade in Algiers will have interest to the producers of patent fuel in this country. It is to the effect that "great pressure" had been used to compel the railway companies to use patent fuel of French manufacture. In 1886, from this cause, the supplies of patent fuel from England were reduced whilst the experiment was tried. But it was found "that the French fuel really cost 20 per cent. more than that obtained from England, so they have reverted to the latter." The makers of patent fuel here—and they are increasing in number—should give this fact, officially stated, a very wide circulation.

A Warning.—German clerks and workmen are most earnestly warned against seeking an El Dorado in Bombay. It is a fact that in all the larger commercial houses in Bombay future vacancies have been promised for years in advance to young Europeans; and therefore so-called "outsiders" can only reckon upon finding work in the rarest cases. For European workpeople there is no demand whatever, the cheapness and convenience of native labour allowing of no competition. A native workman lives ordinarily on 3 to 4 rupees (6 to 7 mks.) per month, even in larger towns. Moreover, he possesses an advantage over other workmen that he is able to work with his naked feet as well as his hands—an advantage which must not be underestimated, as those who have visited India know. Even large factories have only one or two European overseers at most, the remaining employés being all natives. The European who goes out to India in the hope of obtaining work is sure to meet with disappointment and is likely to come to grief. Merchants, moreover, should be warned against going to Bombay, unless they are able to live one or two years upon their private means. Competition in all branches of trade is very severe, and profit small.—*Kuhlow.*

The Rabbit Pest in Australia.—The conference upon the means of dealing with the rabbit pest has resulted in the selection of an island where M. Pasteur's and other methods of extirpation will be thoroughly tried. The liability of other animals and birds to infection by the same means will also be tested.

## STATISTICS OF THE MANUFACTURE OF COKE IN THE UNITED STATES, 1886.

| States and Territories. | Number of establishments. | Ovens, December 31. Built. | Ovens, December 31. Building. | Coal used. | Coke produced. | Yield of coal in coke. | Total value of coke. | Value coke per ton. |
|---|---|---|---|---|---|---|---|---|
| | | | | *Tons.* | *Tons.* | *Per cent.* | | |
| Alabama | 14 | 1,301 | 1,012 | 635,120 | 375,054 | 59 | $993,302 | $2·85 |
| Colorado | 7 | 483 | 0 | 228,060 | 142,797 | 62·6 | 569,120 | 3·99 |
| Georgia | 2 | 300 | 0 | 136,133 | 82,680 | 60 | 179,081 | 2·17 |
| Illinois | 9 | 335 | 0 | 17,806 | 8,103 | 46 | 21,487 | 2·65 |
| Indiana | 4 | 100 | 18 | 13,030 | 6,124 | 47 | 17,953 | 2·93 |
| Indian Territory | 1 | 40 | 0 | 10,242 | 6,351 | 62 | 22,229 | 3·50 |
| Kansas | 4 | 36 | 0 | 23,062 | 12,493 | 54·2 | 19,204 | 1·54 |
| Kentucky | 6 | 76 | 2 | 9,055 | 4,528 | 50 | 10,082 | 2·23 |
| Montana | 4 | 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Mexico | 2 | 70 | 0 | 18,194 | 10,236 | 56 | 51,180 | 5·00 |
| Ohio | 15 | 560 | 0 | 59,332 | 34,932 | 59 | 94,042 | 2·69 |
| Pennsylvania | 108 | 16,314 | 2,558 | 8,290,849 | 5,406,597 | 65·2 | 7,664,023 | 1·42 |
| Tennessee | 12 | 1,485 | 126 | 621,669 | 368,139 | 59 | 687,865 | 1·87 |
| Texas | 1 | 0 | 0 | 0 | 0 | 50 | 0 | 0 |
| Utah | 1 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia | 2 | 350 | 100 | 200,018 | 122,352 | 61·1 | 305,880 | 2·50 |
| Washington | 1 | 11 | 21 | 1,400 | 825 | 58·7 | 4,125 | 5·00 |
| West Virginia | 29 | 1,100 | 317 | 425,002 | 264,158 | 62 | 513,843 | 1·94 |
| Total | 222 | 22,597 | 4,154 | 10,688,972 | 6,845,369 | 64 | $11,153,366 | 1·63 |

"Good Wine Needs No Bush."—Messrs. Spiers and Pond have secured from the Royal cellars of the late King of Bavaria, some Steinwein of 1540, the days of Henry VIII.; Leistenwein of 1631, the reign of Charles I.; Steinwein of 1731, when George II. reigned; Johannisberg of 1811, the beginning of the Regency; and Rudesheimer and Hockheimer of 1822, when George IV. was King. The wines are on sale at the Criterion and Messrs. Spiers and Pond vouch for their pedigree.

Coke Making on a New Principle.—The Carlton Iron Company Limited, whose works are situated at Stillington, near Stockton, are engaged in constructing forty coke-ovens on a new principle, namely, that invented by Herr Bauer. It is claimed for Herr Bauer's system that it will coke coal that cannot be coked by the ordinary method. The Carlton Company's ovens are the first that have been started in England, but there are some in Scotland, with this difference, however, that whilst the ovens there are circular, those at Stillington will be rectangular. Should the experiment prove successful, the company will lay down a further series of ovens in order to produce the whole of the coke they require for their blast furnaces, instead of deriving their supplies from East Howle Colliery and other sources. The company's works are now fully employed.

Liquid Fuel in the Far East.—The Russian Government is supposed to be hard up; yet it has just managed to assign the sum of £8,000 to equip an expedition to ascertain whether petroleum exists in abundance in the neighbourhood of Vladivostock. The oil is wanted for purposes of fuel, the Russian Pacific possessions being but slenderly provided with coal, and that of a poor quality. Twelve years ago, Russia stole Saghalien from Japan on account of the supplies of coal it was supposed to contain; but, although the mines have been extensively worked by the exiles, none has yet been produced suitable for the Pacific fleet. When war seemed imminent in 1878, Russia had to get a supply from San Francisco and New South Wales, and the vessels containing it lagged so much on the way that had hostilities ensued she would have been in the position of having cruisers at Vladivostock, but no fuel to enable them to go to sea. In 1885, England again put Russia in a fix by buying up directly after the Penjdeh affair all the coal to be had in the Japanese ports. These lessons have not been lost on Russia, which has maintained large stocks of coal at Vladivostock ever since, and is now about to search for liquid fuel. A year ago, several deposits of oil were found in the Oussuri region, and it is not unlikely that a supply will be tapped sufficient for the wants of the Pacific fleet.

A New Opiate.—In the weekly report of the *Berlinische Klinische*, Professor Kast, of Freiburg, announces his discovery of a new opiate. He calls it "sulfonal," and is an oxidation product of the union of "ethylmercaptan" with acetone, in crystals without taste or smell, and easily soluble. It has the property of inducing sleep in invalids, particularly in nervous people and those affected with heart-disease; but not in healthy subjects. Professor Kast has observed that "sulfonal" produces sleep without altering the pressure of the blood in any great degree. An accident led to the discovery of the sleep-producing property of "sulfonal." It had been administered to some dogs with quite a different intention, and the animals first were affected as if with intoxication, and afterwards fell into a deep sleep. Experiments made on healthy persons, chiefly physicians, and then on patients in hospitals and lunatic asylums, have proved that "sulfonal" is a harmless and certain means of producing sleep in invalids.

Agricultural Education.—Recently Lord Cranbrook, replying to a deputation from the Cheshire Dairy Institute, who asked for a grant out of the sum promised in aid of agricultural education, said the department was in a somewhat doubtful position at present, as they were not aware whether the £5,000 had yet been granted by the Treasury, besides this the Agricultural Department of the Privy Council were at present without the necessary staff for going thoroughly into the matter.

The North German Soda Convention.—A meeting has just been held in Frankfort of the principal Berlin soda manufacturers in Germany to discuss the question of extending the North German soda convention to South Germany by creating a syndicate of soda manufacturers in which all Germany would be represented. The proposal, however, has been dropped owing to the opposition of the Association of Chemical Factories in Mannheim which not only objects to a reduced production, but is disposed to insist upon an increase of the same.—*Kuhlow.*

Sugar Bounties.—The *Times* understands that the Sugar Bounties Conference have arrived at a practical agreement, that the final protocol, establishing a treaty under which sugar bounties are to be abolished, will receive the signatures of all the representatives of the Powers to-day or to-morrow, and after this week there will probably be an adjournment till Thursday, July 5, when it is hoped that the treaty will be signed.

Gas and its Rivals.—Mr. Wyatt, at the meeting of the Gas Managers' Association, on Saturday, gave good advice to the controllers of our gas supplies. He said "they should not frighten themselves, but do their best to produce cheap gas." Gas managers now recognise the fact that the petroleum industry is coming to the front. And there is also the certainty that electricity will be more and more used for lighting large centres, so that the struggle for the survival of the fittest to which Mr. Wyatt alluded is approaching.

The Cost of Dredging.—During the past year 2,129,750 tons of material were dredged from the channel of the river Tees, at a cost of £22,599 12s. 4d., being about 2·54d. per ton. The material dredged consisted principally of boulder clay. About 200 stones, which were too large to be raised by the dredger, were lifted by means of divers. Some of the stones weighed about 2½ tons; 50 oak trees, some of which were 50 feet in length and 3 feet 6 inches in diameter, have also been raised. The spoil has all been conveyed to sea, or an average distance of 7½ miles, by means of hopper barges and steam tugs. The channel has now been deepened for a distance of 4½ miles, to a depth of 20 feet below the original level at low water.

Discouraging Native Industries.—"Vindex" has his growl in the *Glasgow Herald* in the following words:—"Sir,—In going through the Exhibition buildings to-day I was surprised to find a portable railway, with turntables and trucks, in use by the executive, all of which has been manufactured by a well-known French maker. Now, sir, as this very class of goods is extensively manufactured in Glasgow, and as the Scotch manufactures compare very favourably with the French, both as to quality and price, it is difficult to understand why the French manufacturer should have got the preference. This surely requires explanation."

Here and There.—The district of Elberfeld, in the Rhine province of Prussia, has, as regards population and industry, so many things in common with Bradford and its district that the likeness is a matter of common observation. But here is a bit of news that strikes out a point of unlikeness, showing how wide asunder are the notions that regulate the work-a-day world here and thereaway:—"The hours of work are long in Elberfeld, and in some factories the weavers who are on piecework are employed seventy-one hours a week, by the choice of the men, who prefer the certainty of regular work to shorter hours."

Institution of Civil Engineers.—A meeting of the association of the Birmingham Students of Civil Engineers was held last week at the Colonnade Hotel, New-street, Mr. J. W. Gray presiding. Mr. F. H. Hewett read a paper on "Pumping Machinery," in which he traced the advance made in the invention of pumping contrivances, and pointed out that the supremacy of the Cornish pumping engine remained undisputed, as the best engine for deep drainage and against a constant head of water.

Coal in Ohio.—The Chief Inspector of Mines for the State of Ohio gives a favourable account of the output of coal and of the coal trade for Ohio for the past year. The introduction of natural gas has not checked the development of the coal trade, and in fifteen years the output of Ohio has been doubled, and now aggregates more than 10,300,000 tons. The mines on an average worked 228 days last year; and there were 52 additional mines opened out. Some idea of coking coal has been entertained, and seems likely to be carried out, so that all round Ohio seems to have good prospects for its coal trade.

Metropolitan Board of Works.—At the last meeting of the Metropolitan Board of Works, when Lord Magheramorne presided, nine tenders were received for works to be done at the Southern Outfall Sewage Works, Crossness, comprising alterations to the existing sewage reservoirs, the construction of precipitation channels, sludge settling channels, liming and iron-water stations, settling ponds, engine and boiler houses, coal vaults, chimney shaft, workmen's cottages, jetty and pier, tramways, and other works. The highest tender was that of Messrs. Perry and Co.—£295,184—and the lowest that of Mr. W. Webster—£259,816. It was resolved that the tender of Mr. Webster should be accepted.

Gold in Wales.—Though the Crown has asserted its rights in the matter of Welsh gold, we may take it from Mr. Goschen's reply, last week, to a deputation, that the Government does not mean to deal very hardly by Mr. Pritchard Morgan or Mr. Chidlaw Roberts, the *exploiteur* and freeholder of the famous Gwynfynydd gold mine. Mr. Morgan has already, in a letter published in the *Times*, given a comical account of the difficulties which have beset his enterprise. They are of a varied sort, but the main obstacle he has had to confront is the 1-30th royalty on all the gold obtained which the Crown claims, and which apparently would press with great severity, not so much on Mr. Morgan as on Mr. Roberts, the owner of the freehold, in virtue of the covenant between them. As, however, Mr. Goschen seems to have announced that the Government will do "all possible to develop the industry," there are evidently better times in store for the courageous pioneer of gold mining on a profitable scale in the British kingdom.

Another Extraordinary Discovery of Gold in North Wales.—For some time a number of men have been engaged removing rocks at the approach to Holyhead harbour. During the operation the divers—Guthrie and Moncas—struck a vein of rock glittering with golden particles. A portion of quartz has been submitted to a chemist for analysis, and pronounced to be gold. The men have ceased working, awaiting Government instructions. The gold vein is directly connected with the famous Platters Rocks blocking the entrance to Holyhead harbour.

Gold-mining in Wales.—A representative meeting was held at Dolgelly on Wednesday night in last week, to take steps in order to bring pressure upon the Government to reduce their royalty charges on gold and silver mining. It was stated that but for Gwynfynydd mine there would probably have been great local destitution last winter, as agriculture was so depressed. At present the immense capital which would otherwise be spent in developing the mineral wealth of North Wales was being withheld, as under Crown royalty arrangements mines could not be worked except at a loss. The covenants sought to be introduced in the Government leases were asserted to be exceeding stringent. It was, moreover, stated that Mr. Pritchard Morgan had written to say that he had seen Mr. Goschen upon this subject, and Mr. Goschen was inclined to be as considerate as he could, but his Ministerial office put him in a delicate position. Eventually it was resolved to hold a public meeting, to which would be invited Sir Watkin Williams Wynn, Lord Harlech, and other leading landowners, as well as Mr. Broadhurst, M.P., and Mr. Thomas Ellis, M.P. A deputation will afterwards wait upon the Government.

Dr. Knorr's Antipyrine.—One of the most important discoveries in chemical science is that of antipyrine, due to the researches of Dr. Knorr on pyrazole. This substance which is sold as a specialty by the Farbwerke vorm. Meister, Lucius and Brüning of Höchst-on-Main, has been called antipyrine on account of its antipyretic properties (first observed by Dr. W. Filehne of Breslau), and is produced by the action of phenylhydrazin on acetic ether, and the subsequent methylation of the product. Its composition corresponds to the formula $C_{10}H_{12}N_2O$. Antipyrine as it is found in commerce is an artificial organic base, in the form of a crystalline powder, or in scales, remarkable for its ready solubility in water. Antipyrine is at present, on the continent, one of the most important and multifariously employed of medicaments, for it can be employed in a variety of cases. Special attention has lately been called to this specific, owing to the great success which has attended its use with the Emperor of Germany for the reduction of high fever.—*Kuhlow.*

A New Coke Association.—At a meeting of the coke and coke-coal producers of the Mining District of Dortmund, at which 80 per cent. of the entire production was represented, a resolution was passed to found a selling company under the title of the Westfälische Kohlenvereinigung. The accession of the works not represented is expected. The constituting assembly is fixed for the end of June, or the beginning of July. —*Kuhlow.*

Mining Explosives.—Under the title of the Miners' Safety Explosive Company, a company has been registered, with a capital of £200,000, in £10 shares. The objects of the new undertaking are to prevent or diminish the loss of life and accidents caused by explosions in mines from the use of dangerous explosives, and to acquire and deal in any inventions which may bring about such results; to acquire all or some of the British, Colonial, and other patents for or licenses to use the inventions of Arthur Xavier of Paris, for improvements in the manufacture of explosives, and in cartridges containing such improved explosives, and any other patents or *breveté d'invention*, concessions, secret processes, or any license, right, or interest therein; to purchase, acquire, and carry on in England and elsewhere the business of manufacturers and dealers in "explosives," which term shall comprise and include the said invention with any improvement therein, and also any other explosive capable of being used for blasting, etc. Among the first subscribers are Sir George Elliot, Bart., M.P., and Mr. G. W. Elliot, M.P.

Good Pumping.—Under Saturday's date, a telegram from Alexandria states that the pumping engines for reclaiming Lake Aboukir started working on the previous day, in the presence of a number of eminent engineers and visitors. With a consumption of 6 cwt. of coal the engines discharged 27,000 cubic metres of water 6 feet 8 inches high every hour. This is much above the guaranteed result.

A Pint of Chloroform Daily.—An inquest was held at Holborn Town Hall, last week, on the body of Louisa Mary Blake, midwife, who died while under the influence of chloroform. Dr. Gould said the deceased was the greatest chloroform taker in the world, and took as much as a pint a day. A verdict of death from misadventure was returned.

Natural Gas Explosions in America.—The Protestant cathedral of St. Paul and Buffalo has been burned down through the explosion of natural gas in the vaults beneath the edifice. The loss is estimated at $250,000. Several other explosions of natural gas have occurred at Buffalo, though in these cases the damage was only slight. The explosions are attributed to excessive pressure.

Tobacco from the Cameroons.—The second experimental consignment of tobacco from the Cameroons has arrived in Germany, and been submitted to a very careful testing by a Bremen firm of high repute. We understand that this year's crop shows a very considerable improvement in comparison with that of last year, and that according to the opinion of experts, the Cameroon cover leaf if carefully treated and fermented will be able to compete energetically with the Sumatra product, and possibly beat it. The tobacco leaf from the Cameroons is large and silky, and therefore admirably adapted for the outside of cigars.—*Kuhlow.*

# Correspondence.

## BAD TRADE AND ITS REMEDY.

*To the Editor of the Chemical Trade Journal.*

Sir,—One of the most serious results of the badness of our home trade is the enormous quantity of money sent away to establish mills and works in foreign countries, where the return for money invested is higher than in this country. Such mills and works when established become competitors both for our foreign and home-trade. They have no difficulty in this, as their workpeople have to work longer hours for less money. Besides this, we send them our best machinery, and men to show them how to work it. Although the founders of such mills are Englishmen, they have no belief in what is styled Free-trade, and take care to exclude English goods as far as possible by putting on an import duty of from 20 to 50 per cent. The way such tariffs affect us is most disastrous. In many cases we cannot get in at all—the tariff is too high. In other cases we are compelled to make goods at a low price in order that when the duty and charges have been added our price shall not be higher than that of the foreign made article, hence the reason why profit on our export trade is so small. We do a large export trade for a small profit, as many people engaged in it know full well to their cost. Whether they like or not the wages of working men will have to come down. The only way to prevent it is to put a duty on all goods coming from abroad which can be made in this country. It should be plain enough that if we send money abroad for things which can be made by our own people an injury is done to our own people. Further than this, we allow most things to come in from abroad duty free, while the producer in this country has to pay taxes for all sorts of things. If people in this country shut their eyes and refuse to examine into this question, a time will come (and it is not very far off) when they will be compelled to look into it.—Yours, etc.,

James Margerison

## THE WELSH GOLD MINES.

ON the 4th inst. the Attorney-General appeared before Mr. Justice North, in the Chancery Division of the High Court of Justice, on behalf of the Crown, to restrain Mr. Morgan from removing gold from the Gwanfynydd mine, Merionethshire. He said Mr. Morgan had removed considerable quantities of gold from the mine without making arrangements with the Crown, and after warning Mr. Morgan it had been found necessary to come to court. Mr. Morgan wished to know under what statute he was restrained? Mr. Justice North said that would be a question for trial. Mr. Morgan said the Crown had come down from its pedestal to a court of law, and was not entitled to any more consideration than any other litigant. He made no affidavits, but he asserted that the Crown had plenty of other opportunities of dealing with the question, and the granting of an injunction would be against the public policy. If it was the law of the land, the Crown must take all the gold and throw the men out of employment. Mr. Justice North granted an injunction until the trial of the action restraining Mr. Morgan from removing gold, and said if Mr. Morgan came to an arrangement with the Crown an application could be made to suspend the injunction.

## OLIVE OIL.

WHAT is "pure olive oil?" The average intelligent schoolboy, to say nothing of Macaulay's famous urchin, would probably say "Olive oil!" Nothing of the kind. Cottonseed oil is now pure olive oil. At least it ought to be if trade marking roguery could only make it so. It is stated in a contemporary that cottonseed oil is shipped from the United States in vast quantities to Spain and Italy, whence it returns to America labelled "Pure Olive Oil." For adulterating purposes it enters largely into all fatty substances for domestic consumption, such as lard, butter, cheese, etc.; and there is quite an extensive demand for it in the Northern States for the manufacture of "Pure French Sardines" out of a small local herring. The labouring classes in towns such as Marseilles have taken to consuming this oil as an article of food in place of olive oil, because of its cheapness. Pure olive oil is getting more scarce—or rather more difficult to procure—every year, as the practice of mixing the produce of the Riviera with inferior oils from Sicily and Tunis, and also with cotton and sesame oils, is all but universal now among the large dealers.

## BRONZE TESTS.

THERE have been completed at the Watertown Arsenal some interesting tests of alloys, which the Government had ordered, with a view to getting the best possible material for the screws for the fifteen or twenty new war ships now building. The results are as follows:—

ALUMINIUM BRONZE AND BRASS.

| Bronze Composition. | Lbs. Elastic Limit. | Per cent. Elongation. | Lbs. Tensile Strength per sq. inch. |
|---|---|---|---|
| Copper and 8 % Al and Si... | 19,000 | 23·7 | 58,500 |
| Copper and 10 % Al and Si... | 33,000 | 3·2 | 68,000 |
| Copper and 8½ % Al and Si... | 18,000 | 26·0 | 61,000 |
| Copper and 7½ % Al and Si... | 19,000 | 9·3 | 52,000 |
| Copper and 7 % Al and Si... | 17,000 | 11·9 | 46,000 |
| Copper and 8¾ % Al and Si... | 24,000 | 13·3 | 66,500 |
| Copper and 9 % Al and Si... | 28,000 | 4·5 | 66,000 |
| Copper and 10½ % Al and Si. | 33,000 | 3·6 | 72,500 |
| **Brass Composition.** | | | |
| Copper and 3⅛ Al, 33⅓ % Zn. | 55,000 | 1·6 | 70,000 |
| Copper and 3⅛ Al, 33⅓ % Zn. | 65,000 | 2·5 | 82,500 |

## BLEACHING WASH LEATHER, HORN, GUT, Etc., WITH HYDROGEN PEROXIDE.

BY MM. KÖNIGSWÄRTER AND EBELL.

**Preparation.**—The articles to be bleached, more especially leather, must be freed from all impurities and from all fatty adherent matter by washing in soap water. The latter must in due course be removed by repeated washing in soft water.

**First Method.—Bleaching in the Bath.**

In a wooden vessel mix hydrogen peroxide with ammonia of 20° B = 0·935 s.g. Ten litres of hydrogen superoxide and 225 c.c. ammonia are either heated by the insertion of a leaden coil up to 34° C., or the mixture is placed in a warm situation. Into this bleach bath the prepared articles are placed, and allowed to remain therein for twenty-four hours, under constant motion. If bleaching is carried on continuously, then a series of bleach baths can be systematically used. After the lapse of twenty-four hours, the bleaching is complete. The leather must be well pressed out, and constantly washed in soft water. The bleached leather is then gradually dried in a current of air, and at the same time repeatedly worked to render it soft.

**Second Method.—Bleaching in the Air.**

This is an imitation of the grass bleaching. The bleach bath is produced from hydrogen peroxide by the addition, in drops, of ammonia under constant stirring, and in such a manner that when red litmus paper is moistened with it it remains red, while the blue litmus paper remains blue. Into this fluid the leather is plunged, allowed to remain therein for some time, then pressed out and hung up to dry in a current of air. This process, when necessary, can be repeated for the second or third time. The bleached leather is then gradually dried in a current of air, and at the same time repeatedly worked to render it soft and pliable.

## ENGLISH TOBACCO.

IT appears that we have reached the end of our resources in the way of tobacco growing, so far as Government aid is concerned. The Chancellor of the Exchequer announced last week that he had no intention of granting any further concessions to the intending growers of the crop this year, and he entirely set his face against the project for allowing a quantity of tobacco to be grown duty free for a few years. We submit that there is a grievous error in this policy which it was scarcely to be expected a Conservative Government would have committed. Tobacco culture has been revived in this country, after a lapse, generally speaking, of more than a century, and it is as yet only in the period of experiment. No one disputes that, if the crop can be grown with tolerable certainty year by year, it will be a considerable aid to agriculture. Many prophecies of "impossibility" met the first essays to cultivate the plant, and now that the fact of suitability of soil and climate for certain varieties of it have been demonstrated favourably in regard to this country, serious doubts are being hazarded as to the marketable quality of the crop when it is grown. What is wanted is some four or five years of experimental cultivation, with a view of settling the disputed questions, and this can only be accomplished by means of a relaxation of the stringent Excise regulations fettering so heavily the agriculturists who are willing to undertake the task. In our opinion, every possible facility should be extended to the gentlemen who are engaged in the attempt to reintroduce amongst us a profitable industry which, through an utterly mistaken fiscal policy, was suppressed by force of arms.

## THE POLLUTION OF THE RIVER RHONDDA.

COMPLAINTS AGAINST SEVERAL COLLIERIES.

AT a meeting of the Ystrad Local Board held last week, under the presidency of Mr. E. Evans, formerly of Pencelli, now residing at Cardiff, the surveyor, having been directed to investigate the charge made by the secretary of the conservators of the Taff and Ely rivers that rubbish from different collieries was being tipped into the Rhondda River or its tributaries, reported that the management of four pits had not ceased tipping according to the request of the board. Blaenrhondda Colliery tipped coal refuse into a culvert leading to a brook connecting with the the river; Ynysyfeio right into the river; Abergorkey Level into a brook, the water of which flowed into the river; and Tylacoch into another brook. Refuse was also conveyed by the Swansea Bay Railway workmen into the river by means of a tributary. All the other collieries alleged to have been tipping into the river had ceased doing so.—The clerk was directed to write to the respective companies requesting them to immediately abate the nuisance, otherwise proceedings would be taken against them.

## THE FERTILISER MOVEMENT.

THE past three months have witnessed an extraordinary demand for fertilisers all over the country, and especially in Baltimore and the South, where the business is reported to be the heaviest on record. Over seventy thousand tons of phosphate rock have been consumed in Charleston in making the year's supply of fertilisers, and nearly half as much sulphur, in addition to kainit, marl, potash, blood, fish scrap, bone black, cottonseed meal, tankage, and other materials. Shipments of phosphate rock to other markets have likewise increased to a large extent and the companies engaged in this industry are more hopeful of meeting expenses than they were this time last year, when sharp competition and state interference hovered over the trade like a dark cloud.

The foregoing facts demonstrate plainly that commercial or manufactured fertilisers are rapidly taking the place of natural or home-made manures. Manufacturers have a reputation to sustain and they are not disposed to put inferior goods upon the market; on the contrary, there is sharp rivalry among leading firms and they refer with pride to the quality of their products. They are stimulated to excel by the enlarge dconsumptive channel, and are assisted in the improvement of their brands by the excellent work of the agricultural experiment stations.—*Oil, Paint and Drug Reporter.*

## THE AMERICAN TARIFF.

THE Democratic Caucus has adopted a resolution to the effect that the amendments to the Tariff Bill suggested at the meeting should be referred to the democratic members of the Ways and Means Committee for consideration, the said members to report back to a future meeting of the Caucus, with recommendations thereon. Numerous amendments were thereupon presented, including proposals to place upon the free list sheep shears, surgical instruments, coal, machinery used in the manufacture of cotton or woollen goods, and German looking-glass plates, and to reduce the tariff on manufactured woollen goods 25 per cent. *ad valorem*, and the sugar duty 50 per cent. It was not proposed to reduce the duty on rice. An amendment was also suggested for the repeal of internal taxation, and the imposition of an income tax to supply the deficiency. In this connection it was proposed to place on the free list all manufactured products of domestic production controlled by trusts.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

SULPHATE of ammonia has during the week been showing signs of some little picking up, and to-day it has at least 3s. 9d. to the good as compared with Tuesday last. Buyers are easily had at £11. 7s. 6d. Leith, while, on the other hand, sellers are very willing at £11. 10s., a price which the present mild spurt may or may not reach. Inquiry over forward business is meanwhile very brisk for ammonia, but of recorded transactions in this department of the market there is none yet, the estimates of sellers and buyers being too wide apart. The general chemicals market in Scotland is lifeless to a degree, demand being very sickly; and some makers are ready with quite unusual sacrifices to tempt business, but the period of revival does not appear to have quite matured, and demand, it seems, will not be whipped into activity. For a week the weather has been warm with a moderate but steady warmth, and this will affect some sections of the manufacture. Paraffins are all very dull, and one of the oil companies has just declared a loss over the working of the year. Bleach is easier at about a half-crown reduction. Bichromates still in but feeble demand. General prices current are:—Soda crystals, 40s. net Tyne; alum in lumps £5, less 2½ % Glasgow; borax, English refined £31, and boracic acid, £41 net Glasgow; soda-ash, 48/52°, 1d., less 5 % Tyne; caustic soda, white, 76°, £8. 5s.; 70/72°, £6. 17s. 6d.; 60/62°, £5. 17s. 6d.; and cream, 60/62°, £5. 15s., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5, and 1 cwt. casks, £5. 5s. net Tyne; refined alkali, 48/52°, 1½d., less 2½ % Tyne; saltcake, 21s., less 2½ %, f.o.r. Glasgow; bleaching powder, £7. 12s. 6d. to £7. 15s., less 5 %, f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 9/7½; chlorate of potash, 5¾d., less 5 % any port; sulphate of ammonia, £11. 7s. 6d. to £11. 10s., f.o.b., Leith; sulphate of copper, £21. 10s.; paraffin scale, hard, 2 15/16d., soft 2d.; paraffin wax, 120° semi-refined, 2 11/16d.; paraffin spirit, 4½d.; burning oil, 5¾d. to 6d.; lubricating oil, 865°, £5 to £5. 5s.; 885°, £6 to £6. 10s.; and 890/95°, £7. 10s. to £7. 15s. Sugar imports at Greenock last week were 27,301 bags.

## THE LIVERPOOL MINERAL MARKET.

OUR market has continued to rule very steady, with an upward tendency. Manganese: More doing, but prices are unaltered. Magnesite (containing 98 % of carbonate of magnesia) steady at 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite (Irish Hill brand): Increased sales have been made, and prices are firmer; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk continues in increased demand, a fair quantity having been sold at full prices—90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate): The good demand continues. Selected crystal lump is scarce at £6. 5s.; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s. ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone in demand; ground, at £7; specially selected lump, finest quality, £10. 10s. Iron ore in fair request—Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s.; Cumberland, 9s. to 9s. 6d. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emery-stone: Best brands are in good demand at £5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore still in fair demand, and prices are firm. Antimony ore firm; £16 to £22 for fair quality. Antimony metal unchanged. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d.; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; Italian and Bohemian, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50. China clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s.

## LIVERPOOL CHEMICAL MARKET.

CHEMICALS continue in fair demand, and prices have remained without much alteration. Soda-ash 1d. up. Caustic soda: 60 per cent. white, £6; 60 per cent. cream, £5. 17s. 6d.; 70 per cent. white, £7; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda 10s. 6d. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder £7. 15s. for hardwood, and £7. 10s. softwood. Saltcake at 21s. Bichromate of potash at 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £18 to £20. Chlorate of potash, 5¾d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. 5s. to £12. 10s., strong. Lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s.

Chloride of magnesium (antiseptic), strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax, unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Pearl-ashes, £2. 3s. Chloride of zinc (solid), £18.

## THE LIVERPOOL COLOUR MARKET.

Colours are without change. Ochres: Oxfordshire is quoted £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of Zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

Business in soda-ash continues to be fairly active, and leading firms are well engaged with orders for some time to come. Best brands of bleaching powder are also well sold, but some odd parcels are to be had at slightly easier rates—£7. 5s. to £7. 7s. 6d. f.o.r. are the current quotations, according to brand. Chlorate of potash is said to be rather scarcer, but 5¾d. will still buy. Caustic soda is moving off freely at the lower prices. Sulphate of copper shows no improvement in price, demand being very small. The same cause is operating against any advance in values of other metallic salts. Lead acetates (in every grade of quality), lead nitrate, litharge, tin crystals, and zinc salts, are moving very slowly. Prussiate of potash is more freely offered, and foreign is quoted at 6¾d. per lb. Sulphocyanides, acetic acid, and acetates of alumina are also quiet, and inclined to droop in prices. Brown acetate of lime is selling more freely at the lower price. "Grey" is quiet. Potash, carbonate and caustic, are maintained in price. Ammonia and salts are still quiet, and prices are unchanged.

## THE TAR PRODUCTS MARKET.

Several holders of small stocks of benzol seem desirous of selling, and though they do not seem to care to take the current price of 2s. 10d. for 90's yet they are beginning to come to the conclusion that it may be policy to do so. There is no doubt that a show of weakness has now set in, and those are best off who have sold for the year; 50/90's benzol is worth 2s. 4d., but even at this price buyers are very chary of purchasing any quantity. Crude carbolic is scarcely so firm as it has recently shown itself, and it is feared the price will soon decline. Solvent naphtha is firm at old prices, and the same may be said of creosote and Lucigen oil. Pitch remains in *statu quo*, and as the warm weather is advancing no improvement can be expected in prices at present.

## THE SULPHATE OF AMMONIA MARKET.

We are glad to report that there is a good inquiry from the Continent for May and June shipment, which, if it continues, must cause prices to at least remain firm. Hull values have now risen to £11. 7s. 6d., but as every penny of an advance has to be fought inch by inch it is not surprising that the rise from £11 has been a slow one. The Leith market stands at £11. 7s. 6d., and London rising from £11. 10s. Beckton price still remains at £11. 12s. 6d., but it is deemed uncertain how long it will continue so. Stocks are so low that makers have the market pretty well in their own hands; still we think it is unadvisable to hold any considerable quantity for the realisation of extreme values; a rising market will only result from a steady and legitimate business being done at slightly more than current values.

# New Companies.

Anglo-Continental Aluminium Company Limited.—Capital, £1,000,000 in £5 shares.
Ashford and London Steam Flour and Bakeries Company Limited.—Capital, £60,000 in £1 shares.
Astley, Marsden, and Company Limited (drysalters).—Capital, £2,000 in £5 shares.
Australian Pearl Fishing Company Limited.—Capital, £50,000 in £1 shares.
Bell's Asbestos Company Limited.—Capital, £200,000 in £5 shares.
Cape Copper Company Limited.—Capital, £600,000 in £2 shares.
Carnarvonshire Freehold Copper Mining Company Limited.—Capital, £25,000 in £1 shares.
Ceramic Patent Letter and Enamel Company Limited.—Capital, £25,000 in £1 shares.
Chandor Petroleum Gas Candle Company Limited.—Capital, £100,000 in £5 shares.
Clamp Brick Company Limited.—Capital, £2,000 in £1 shares.
Day and Company Limited (tanners).—Capital, £30,000 in £10 shares.
Gas and Water Investment Trust Company Limited.—Capital, £3,000,000 in £5 shares.
Hercules Dynamite and Explosives Company Limited.—Capital, £100,000 in £5 shares.
John Spencer and Sons Limited (steel manufacturers).—Capital, £400,000 in £100 shares.
Leech, Neal, and Company Limited (colour manufacturers).—Capital, £60,000 in £20 shares.
Miners' Safety Explosive Company Limited.—Capital, £200,000 in £10 shares.
New Discoveries Limited.—Capital, £20,000 in £5 shares.
United Soap and Perfumery Manufacturers Limited.—Capital, £30,000 in £1 shares.
Universal Patent Fuel Machine and Manufacturing Company Limited.—Capital, £75,000 in £1 shares.
Upper Culm Valley Dairy Company and Farmers' Association Limited.—Capital, £2,000 in £1 shares.
Waterproof Materials Company Limited.—Capital, £250,000 in £1 shares.
Whitworth and Company Limited (iron and steel manufacturers, &c.) Capital, £700,000 in £10 shares.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Glass Bottles.** W. Ambler, J. Rhodes, and S. Rhodes. 6639. May 4.
**Utilising Tidal Power.** A. F. A. Manier. 6641. May 4.
**Secondary Batteries.** B. D. Williams. 6657. May 4.
**Regulating Air passing up Chimneys.** G. Kendal. 6662. May 4.
**Artificial Fuel.** C. H. Mowll. 6663. May 4.
**Extracting Wool Oil.** A. J. Boult. 6669. May 4.
**Extracting Wool Oil.** A. J. Boult. 6671. May 4.
**Improved Treatment of Materials for the Production of a Carbonised Body, suitable for various useful purposes.** E. Johnson. 6687. May 4
**Ammonium Nitrate.** C. N. Hake and R. H. Heenan. 6694. May 4.
**Ammonium Nitrate.** C. N. Hake and R. H. Heenan. 6695. May 4.
**Ammonium Nitrate.** C. N. Hake and R. H. Heenan. 6696. May 4.
**Improved Oil Lamp.** A. Battye. 6701. May 5.
**Damp-Proof Packages.** W. J. Williams. 6705. May 5.
**Machines for Pressing Bricks.** J. Craven and B. Craven. 6712. May 5.
**Paving Blocks from Blast Furnace Slag.** C. Brand. 6724. May 5.
**Automatic Disinfection.** J. W. Knights and W. D. Gall. 6738. May 5.
**Portable Electric Lamp.** J. T. Armstrong and A. Serraillier. 6740. May 8.
**Colouring Matters.** H. H. Leigh. 6743. May 5.
**Anemometers.** D. C. E. Steinbrenner. 6748. May 5.
**Drilling and Tapping Holes in Water.** G. H. Turner. 6750. May 5.
**Filtering Apparatus.** F. H. Atkins and W. G. Atkins. 6753. May 5.
**Apparatus for Dyeing and Sizing Yarns.** J. Nelson and A. Nelson. 6756. May 5.
**Evaporating and Concentrating Liquids.** E. Tucker. 6764. May 5.
**Manufacture of Starch.** H. Keil and R. Stoltenhoff. 6778. May 7.
**Apparatus for Raising and Forcing Fluids.** J. C. Stevenson and J. Marshall. 6799. May 7.
**Recovery of Bromine, Chlorine, etc., in Gold Extraction.** T. K. Rose. 6812. May 7.
**Valve Motion for Steam Pumps.** J. H. Berry. 6821. May 7.
**Apportioning Furnace Drafts.** W. Fairweather. 6825. May 8.
**Candles.** J. M. Storrar. 6827. May 8.
**Steam-Jet Compressors.** R. Shackleton. 6830. May 8.
**Non-Intoxicating Beverage**—(Complete Specification). 6839. May 8.
**Machinery for Washing Textile Fabrics.** J. S. Farmer. 6847. May 8.
**Extracting Volatile Bodies from Substances.** O. C. Hagemann. 6851. May 8.
**Millstones.** M. L. Utzon. 6859. May 8.
**Feeding Oil for Lighting and Heating.** W. Defries and V. J. Feeny. 6862. May 8.
**Thermometers.** E. Jones. 6865. May 8.
**Purifying Alcohol and Obtaining Aldehydes and Acetones.** J. Y. Johnson. 6869. May 8.
**Producing a Rustless Coating on Steel.** W. P. Thompson. 6872. May 8.
**Retort and Filtering Stands.** F. D. Delph. 6874. May 8.
**Conversion of Pig Iron into Steel**—(Complete Specification). J. W. Bookwalter. 6886. May 9.

**Apparatus for Drying Materials.** J. T. Pullon. 6896. May 9.
**Separating Isometric Xylidines.** L. Limpach. 6899. May 9.
**Storage Batteries.** M. Immisch. 6907. May 9.
**Purification of Coal-Gas.** W. A. McIntosh-Valon and Brin's Oxygen Company Limited. 6920. May 9.
**Liquid Meters.** J. Thomson. 6932. May 9.
**Mercurial Antiseptic Soap.** J. Thomson. 6939. May 9.
**Purification of Oils and Fats.** W. A. Mitchell and O. C. Hagemann. 6949. May 9.
**Converting Iron into Steel**—(Complete Specification). J. W. Bookwalter. 6951. May 9.
**Converting Iron into Malleable Iron**—(Complete Specification). J. W. Bookwalter. 6952. May 9.
**Manufacture of Zinc from Hard Spelter or Galvanisers' Dross.** A. G. Greenway. 6956. May 9.
**Grease Interceptors for House Drains.** W. D. Scott-Moncrieff. 6960. May 10.
**A White Pigment of Lead.** J. B. Hannay. 6972. May 10.
**Muffle Kilns.** G. Lazenby. 6980. May 10.
**Treatment of Hides for Belting.** C. L. Royer. 7007. May 10.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

W. G. Todd and H. K. Austin, under the style of the Asbestos and Engineers' Supply Company, Birmingham, Asbestos manufacturers.
E. Banks and T. Forester, Hanley, earthenware manufacturers.
Formby, Keizer, and Co., Liverpool, engineers, boiler makers, and iron and brass founders.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Smith, Frank Paul (trading as John Smith and Son), Greystonedale, Haltwhistle, Northumberland, varnish manufacturer.
Dixon, Henry Benjamin, Hanley, chemist.
Selby, William Sisson, High-street and Douglas-street, Deptford, Brockley-road, Brockley, and Church-street, Lee, Kent, oil and colourman.
Haslip, James Frederick, New Southgate, Middlesex, oil and colourman.

### Adjudications.

Evans, John Cooper, Eveline-villa, Dacre-road, Upper Manor-park, late of Boston-road, Hanwell, oil and colourman.
Smith, Frank Paul (trading as John Smith and Son), Greystonedale, Haltwhistle, Northumberland, varnish manufacturer.

### First Meetings and Public Examinations.

Dixon, Henry Benjamin, Hanley, chemist. May 18, Royal Hotel, Crewe; June 1, Town Hall, Hanley.
Forrester, Thomas, Chorley, Lancashire, dyewood miller. May 18, Official Receiver's Office, Manchester; June 4, County Court, Bolton.
Miller, Thomas Small, and Spraggon, Robert (trading as Anderson and Miller), Gateshead, hat and cap manufacturers. May 23, Official Receiver's office, Newcastle-on-Tyne; May 17, County Court, Newcastle-on-Tyne.
Smith, Frank Paul (trading as John Smith and Son), Greystonedale, Haltwhistle, Northumberland, varnish manufacturer. May 22, Official Receiver's offices, Carlisle; May 22, Court House, Carlisle.
Wood, John, Oldham, wholesale druggist. May 22, Official Receiver's offices, Oldham; June 19, Town Hall, Oldham.

### Notices of Dividends.

Ralph, Philip, Hereford and Holmer, chemist and druggist and farmer. First dividend of 2s. 6d., May 15, Official Receiver's office, Hereford.
Scott, Thomas Henry (trading as Thomas Henry Scott and Co.), Huddersfield, rope and twine manufacturer, asphalter and concreter. First and final dividend of 4¼d., May 15, and any subsequent Tuesday, Messrs. Haigh and Sons, New-street, Huddersfield.
Cooke, William, and Cooke, Mary Catharine (trading as M. K. Kerr and Co.), Sketty and Swansea, oil refiners and grease manufacturers. Second and final dividend of 3s. 8d., June 1, 4, Goat-street, Swansea.
Wyley, Andrew James, St. Heliers, Jersey, late of Eccles, Lancashire, formerly managing director of the Irwell India Rubber and Gutta Percha Works Company Limited, now out of business. First and final dividend of 4d., June 7, Mr. C. F. Heywood's, 22, Great St. Helens, E.C

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 5th.*

**Ammonia Sulphate**—
Jersey, 200 bags. F. Devon
**Acetate of Lime**—
U. States, 175 bgs. Allan Bros & Co.
**Antimony**—
Portugal, 13¼ t. Knowles & Co.
Sydney, 20 E. Hawkins.
**Alkali**—
Holland, 60 c. Howards & Sons
France, 200 P. Hecker & Co.
" 100 Arnati & Harrison
**Acetic Acid**—
Holland, 34 blns. Lister & Biggs
**Bones**—
Germany, 30 t. E. von Rehn
U. States, 12 Hicks, Nash, & Co.
Cape, 2 Hammond & Co.
**Barium Chloride**—
Germany, 28 cks. Petri Bros.
**Borax**—
E. Indies, 10 cs. Ralli Bros.
**Brimstone**—
Italy, 50 t. Union Lighterage Co.
" 5 W. Balchin
" 100 Ekman Pulp & Paper Co.
**Barytes**—
Germany, 23 cks. O'Hara & Hoar
Belgium, 23 W. Harrison & Co.
" 44 Ross & Deering
" 22 Proprs. Scott's Wharf
" 46 Hemmingway & Co.
" 45 W. Harrison & Co.
France, 1 pkge. Flageollet & Co.
Belgium, 115 cks. Ross & Deering
" 43 "
" 23 Hyslop & Symonds
" 114 O'Hara & Hoar
**Beetroot Ashes**—
France, 46 cks. F. W. Berk & Co.
**Caustic Potash**—
France, 10cks. Weatherley, Mead & Co
" 135 pkgs. "
**Cream Tartar**—
France, 15 cks. Webb, Warter & Co.
" 10 " H. S. Smith & Co.
Spain, 3 " Webb, Warter & Co.
Portugal, 34 pkgs. J. Turner & Co.
Holland, 10 cks. M. Ashby
Spain, 4 " G. W. Bristow
Italy, 4 " Berry Bros. & Co.
Spain, 6 " C. Christopherson.
" 2 bls. J. M. Wimble
**Caoutchouc**—
E. Indies, 40 c. Anderson, Weber and Smith
" 35 Adamson, Gilfillan & Co.
" 5 Kebbel, Son & Co.
" 34 L. & S. K. D. Co.
" 218 Middleton, Son & Co.
" 54 Petrocochino Bros.
" 84 G. Ward & Sons
" 162 L. & S. K. D. Co.
" 7 Wallace Bros.
" 5 Rehder & Co.
" 60 E. & W. I. D. Co.
Portugal, 200 Kebbel, Son & Co.
Natal, 26 L. & S. K. D. Co.
**Chemicals** (*otherwise undescribed*)
Germany, £13 W. Burton & Sons
" 470 A. & M. Zimmermann
" 25 H. Lambert
" 11 Domeier & Co.
" 10 Phillipps & Graves
" 46 T. H. Lee
" 644 A. & M. Zimmermann
Holland 20 Beresford & Co.
**Dextrine**—
Germany, 5 bgs. E. & W. I. D. Co.
" 20 " C. Faust & Co.
" 200 " J. Barber & Co.
**Dyestuffs**—
**Aniline**
Holland, 8 cs. Union Lighterage Co.
**Annatto**
E. Indies, 18 brls. Cotesworth & Powell
**Argols**
Cape, 23 bgs. W. Dunn & Co.
Italy, 375 " B. Jacob & Sons
**Cutch**
E. Indies, 1,227 bxs. Anderson, Fairlev & Co
" 3,739 " W. Brandt, Sons and Co.
" 1,611 " Wallace Bros.
" 2,499 " Middleton, Son and Co.
" 2,640 " Un. Lighterage Co.
" 300 " Prs. Brook's Wharf
" 500 " Hoare, Wilson & Co
" 2,195 bgs. Anderson, Weber and Smith
" 1,000 bxs. Wallace Bros.
" 247 " Clift, Nicholsn & Co.
" 373 bgs. Hoare, Wilson and Co.
" 414 bls. L. & S. K. D. Co.
" 1,000 bxs. Hoare, Wilson and Co.
" 500 " Leach & Co.
" 80 " H. Wigmore
**Extracts**
France, 100 cks. Levinstein & Sons
" 6 " T. H. Lee
" 100 bxs. P. Chamberlain Wrf
" 10 cs. Lon. & Tilbury L. Co.
Austria, 202 brls. A. J. Humphery
U. States, 62 pkgs. Williams, Torrey and Co.
" 25 cs. M. D. Co.
" 50 cks. "
**Gambier**
E. Indies, 422 bls. Elkan & Co.
" 158 " J. Graves.
" 431 bgs. S. Barrow & Bro.
Natal, 5 cs. L. & S. K. D. Co.
" 168 bls. "
**Indigo**
Holland, 13 chts. Patry & Pasteur
E. Indies, 49 " E. & W. I. D. Co.
" 149 " L. & S. K. D. Co.
" 20 " Elkan & Co.
" 16 " E. & W. I. D. Co.
" 14 " L. & S. K. D. Co.
" 30 " Stansbury & Co.
" 2 " E. & W. I. D. Co.
" 31 " Arbuthnot, Latham and Co.
" 96 " Wallace Bros.
" 20 " E. & W. I. D. Co.
" 15 " Benecke, Souchay, and Co.
" 31 " Arbuthnot, Latham and Co.
" 32 " L. & S. K. D. Co.
" 7 " Arbuthnot, Chalmers and Co.
" 10 " E. & W. I. D. Co.
**Myrabolams**
E. Indies, 1,334 bgs. Glehn & Sons
" 159 " L. & S. K. D. Co.
" 109 " Beresford & Co.
" 1,450 " Baxter & Hoare
" 1,100 " J. Graves
" 745 " Armitage, Fry & Co
**Orchella**
E. Indies, 87 bgs. Armitage, Fry & Co.
" 59 bls. Forbes, Forbes & Co.
" 12 " H. Vavasseur
" 40 " Clarke & Smith
**Saffron**
Spain, 1 cs. J. H. Fox & Co.
" 1 " Evans, Lescher & Co.
" 1 " Brown, Wills & Co.
**Safflower**
E. Indies, 15 bls. Brown & Elmslie
" 27 " Petrocochino Bros.
**Turmeric**
E. Indies, 500 bgs. Hale & Son
" 110 " L. & S. K. D. Co.
**Tanners' Bark**
Germany, 69 t. Devitt & Hett
" 62 Baxter & Hoare
U. States, 28 H. Kohnstamn
Belgium 58 Vokins & Co
" 56 A. Brooksbank & Sons
**Valonia**
Belgium, 5 tons. A. & W. Nesbitt
**Glucose**
Germany, 90 c. H. Lorenz.
" 493 J. Barber & Co.
" 50 Becker & Ulrich
" 125 J. Keiller & Son
" 420 Seaward Bros.
" 600 R. E. Drummond & Co
" 100 J. Barber & Co.
" 35 Beresford & Co.
" 200 Barrett, Tagant & Co.
" 144 P. Windmuller
" 200 J. Barber & Co.
" 22 Prs. Chamberlain Wharf
" 100 Seaward Bros.
" 910 L. Sutro & Co.
" 485 Anderson, Weber & Co.
" 210 Seaward Bros.
" 280 J. Knill & Co.
" 104 J. Barber & Co.
" 40 Tolme & Rudge
" 29 M. D. Co.
" 250 Middleton, Son, & Co
" 600 Pillow, Jones & Co.
" 200 T. M. Duche & Sons
" 614 Prs. Chamberlain Wf.
Holland, 81 G. Rahn & Co.
U. States, 400 G. Doo
**Gutta Percha**—
B. W. Indies, 30 c E. & W. I. D. Co.
**Isinglass**—
E. Indies, 26 cs. E. Boustead & Co.
" 5 " Hale & Son.
" 2 " L. & S. K. D. Co.
**Litharge**—
Germany, 8 cks. Charles & Fox
" 2 " Beresford & Co.
**Manure**—
**Phosphate Lime**
France, 242 t. Lawes Manure Co.
**Salt**
Germany, 15 t. Petri Bros.
**Piths**
Porto Alegre, 2 t. Anglo Guano Wks.
**Phosphate Rock**
France, 160 t. Anglo Guano Wks.
" 200 Moeller, Graetz & Co.
Belgium, 50 B. Jacob & Son
U. States, 1,860 Wyllie & Gordon
**Meat Meal**
Porto Alegre, 200 t. Anglo Guano Wks

**Kainit**
Germany, 50 t. F. W. Berk & Co.
" 305 "
" 495 Kaltenbach & Co.
**Potassium Muriate—**
Germany, 30 bgs. F. W. Berk & Co.
**Plumbago—**
Germany, 74 cs. E. Pink & Sons
" 71 " Wright&Ashbridge
" 111 pkgs. "
" 11 " O. Scholzig
E.Indies, 73 brls. R. G. Hall & Co.
" 38 cks. "
" 20 " Doulton & Co.
Italy, 67 brls. Thredder,Sons&Co.
" 145 cks. "
Holland, 7 cs. G. Rowney & Co.
**Pearl Ash—**
France, 100 c. Petri Bros.
**Paraffin Wax—**
Rangoon, 707 cs. H. Hill & Son
U.States,85 brls.P.Chamberlain Wrf
**Pyrites—**
Spain, 790 t. G. Ward & Sons
" 694 " Societe Commerciale
La Laja,800 Forbes, Abbott & Co.
**Potassium Sulphate—**
France, 21 brls. Soundy & Son
" 21 " "
" 125 bgs. T. Farmer & Co.
Germany, 144 pkgs. F.W.Berk&Co.
**Pitch—**
Valona,2803 bgs. 76 cs. W. Nicolson and Co.
Belgium, 1 brl. Berlandina Bros.
**Potassium Carbonate—**
France, 16 cks. J. A. Reid
**Sodium Acetate—**
France, 8 cks. W. G. Blagden
" 20 " Hoare, Wilson & Co.
" 20 " Gray, Laurier & Co.
" 10 " A. Zumbeck & Co.
**Salicylic Acid—**
Germany, 5 cs. Burgoyne, Burbidges & Co.
**Salts Potash—**
Germany, 10 kgs. R.Morrison&Co.
**Sodium Nitrate—**
Iquique,10,593bgs.Montgomery&Co
**Saltpetre—**
Germany, 60 cks. J. Hall & Son.
" 40 " F. W. Berk & Co.
" 20 brls. Brown & Elmslie
E.Indies, 1,339 bgs. G.Ward&Sons
" 1,225 " C.Wimble&Co.
**Stearine—**
Belgium, 134 bgs. W. Balchin
**Tartaric Acid—**
Holland, 9 pkgs. Middleton & Co.
" 8 cks. Northcott & Sons.
**Tar—**
France, 56 brls. Berlandina Bros.
**Tartars—**
Italy, 22 cks. Howards & Sons
**Tincal—**
E.Indies, 76 bgs. Ralli Bros.
**Ultramarine—**
Belgium, 6 brls. Leach & Co.
" 5 " "
" 12 cs. W. Harrison & Co.
Holland, 2 cks. Ross & Deering
" 16 " A. Henry & Co.
Germany, 1 cs. G.N.Levermore&Co
France, 4 brls. G. Rahn & Co.
**Verdigris—**
France, 2 pkgs. H. Johnson & Sons
**Zinc Oxide—**
Germany, 62 brls. M. Ashby
" 100 " "
" 194 " "
" 265 " "
" 25 cs. J. Matton
U.States,100 cks. M. Ashby
Holland, 50 brls. "
" 15 " Beresford & Co.

## LIVERPOOL.

*Week ending May 9th.*

**Bones—**
Ceara, 20 t. A. V. Heyder
" 84,384 kilos. Leech, Harrison and Co.
Kurrachee, 6,028 bags.
Constantinople, 600
**Bone Meal—**
Bombay, 5,325 bags
Kurrachee, 350
**Barytes—**
Rotterdam, 22 brls.
**Copper Precipitate—**
Huelva, 100 t. Matheson & Co.
**Chemicals** *(otherwise undescribed)*
Rotterdam, 4 cks.
New York, 578 bgs.
Rouen, 12 cks. Co-op. W'sale Soc.
**Caoutchouc—**
Accra, 10 brls. 2 pns. F.&A.Swanzy
" 23 1 ck. C. Lane & Co.
" 4 Pickering & Berthoud
Salt Pond, 5 cks. F. & A. Swanzy
C. C. Castle, 1 cs. 2 brls. Clare&Co.
" 1 3
Elmina, 2 brls. Boses Bros. & Co.
Grand Bassa, 1 brl. Cie Francaise
Sierra Leone, 48 cks. "
" 17 brls. Pickering&Berthoud
Bathurst, 2 bxs. J. Walkden & Co.
" 4 cs. Kinlock, Campbell, and Co.
" 17 brls. Cie Francaise
Ceara,125brls. Leech,Harrison & Co
Akassa, 2 kgs. Royal Niger Co.
Accra, 1 cs. 13 cks. Pickering & Berthoud
" 24 C. Lane & Co.
" 13 W.J. Rodatz&Co.
" 3 Ridyard & Co.
" 5 4 J. P. Werner
Salt Pond, 4 Edwards Bros.
" 8 Pickering&Berthoud
" 2 brls. C. L. Clare & Co.
" 6 Mosenthal & Sons
" 2 cs. 9
" 3 Pickering&Berthoud
" 1 Bennett&Brotherton
" 1 J. Hart
" 1 Quay & Nephew
" 1 Edwards Bros.
" 3 C. L. Clare & Co.
" 2 Havard & Co.
" 2 Basil Mission
" 8 F. & A. Swanzy
Axim, 1
Assinee, 1 cs. 3 cks. Pickering & Berthoud
Monrovia, 1 bx. Edwards Bros.
Sierra Leone, 1 pn. 15 brls. Pickering & Berthoud
" 1 bag. G. B. Ollivant
" 2 cs. C. F. Johnson
" 6 bgs. 26 cks.
Bouthe, 1 keg 2 brls.
**Camphor—**
Rouen, 1 ck.
Hamburg, 2 cs.
**Cream Tartar—**
Barcelona, 3 cks.
Oporto, 5 Inglis & Wulff
Barcelona, 3
**Chloroform—**
Havre, 2 pkgs. Cunard S.S. Co.
**Dyestuffs—**
**Myrabolams**
Bombay, 930 bags. Forbes & Co.
" 700
**Cochineal**
Las Palmas, 13 bags. Lathbury&Co.
Teneriffe, 25 M. L. Toby
**Indigo**
Rouen, 2 cks. Co-op. W'sale Socy.
**Saffron**
Valencia, 1 cs.
**Divi Divi**
Santa Martha, 107 bags.
Havre, 100 bags. Cunard S.S. Co.
**Orchella**
Hamburg, 740 bls.
**Argols** [London
Oporto, 22 cks. German Bank of
**Madder**
Havre, 5 pkgs. Cunard S.S. Co.
**Glycerine—**
Rotterdam, 5 cbys.
**Glucose—**
Baltic, 400 bags
Hamburg, 35 cks.
**Glauber Salts—**
Bremerhaven, 25 cks.
**Manure—**
**Kainit**—Hamburg, 700 bags.
**Pyrites—**
Huelva, 1,280 t. Matheson & Co.
" 1,005 "
" 1,514 "
" 1,924 Beauford & Co.
**Pitch—**
Amsterdam, 12 cks.
Rotterdam, 50 tubs
**Potash—**
Rotterdam, 73 cks.
Rouen, 21 cks.
" 18 dms. Co-op. W'sale Soc.
Hamburg, 1,985 bags.
**Sodium Nitrate—**
Iquique, 15,685 bags.
**Stearine—**
Rotterdam, 50 bxs.
Ghent, 4 brls. J. T. Fletcher & Co.
**Saltpetre—**
Calcutta, 1,279 bags
Hamburg, 6 cks.
**Sugar of Lead—**
Hamburg, 7 cks.
**Tartar—**
Bordeaux, 21 cks.
**Ultramarine—**
Ghent, 4 cs.

## GLASGOW.

*Week ending May 12th.*

**Alum—**
Rotterdam, 42 cks. Rankine & Son
**Bleaching Powder—**
New York, 36 bxs. J. C. Steel & Co.
**Borax—**
Hamburg, 25 cks.
**Chemicals** *(otherwise undescribed)*
Rotterdam, 4 cks. Rankine & Son
**Dyestuffs—**
**Alizarine**
Rotterdam, 20 cks.
" 42
" 49
**Annatto**
Bordeaux, 2 pkgs.
**Argols**
Bordeaux, 18 pkgs.
**Madder**
Bordeaux, 5 pkgs.
Rotterdam, 2 cks.
**Extracts**
Rouen, 1 pkge.
New York, 50 bxs.
Bordeaux, 25 pkgs.
Antwerp, 8 cks.
**Sumac**
New York, 50 bgs.
**Dextrine—**
Hamburg, 100 bgs.
**Glucose—**
Rotterdam, 1 ck. J. Rankine & Son
Amsterdam, 30 bgs. 15 cks.
**Glycerine—**
Rouen, 2 pkgs.
**Guano—**
Gothenburg, 1,000 bags.
**Manure—**
**Waste Salt**
Hamburg, 500 bgs. 281 cks. 37 brls.
" 100 t.
**Pyrites—**
Huelva, 1,191 t. Tharsis Sulphur and Copper Co.
" 1,050
**Potash—**
Rotterdam, 11 cks.
**Paraffin Scale—**
New York, 360 bgs. Usmar & Co.
" 180 brls.
" 100 H. Hill & Son
" 450 J. H. Usmar & Co.
**Sugar of Lead—**
Hamburg, 8 cks.
**Saltpetre—**
Hamburg, 100 kegs. Poynter & Son
**Tartar—**
Bordeaux, 14 pkgs. J. & P. Hutchison
" 13
Oporto, 4 Inglis & Wulff
Bordeaux, 11
**Ultramarine—**
Antwerp, 10 cs.
**Zinc Oxide—**
Antwerp, 40 cks.
Rotterdam, 50 cks.

## HULL.

*Week ending May 10th.*

**Ammonia Sulphate—**
Rotterdam, 41 cks. W. & C. L. Ringrose
**Alumina—**
Rotterdam, 41 cks. W. & C. L. Ringrose
**Barytes—**
Bremen, 18 cks.
**Chemicals** *(otherwise undescribed)*
Antwerp, 51 bags, 1 brl. Wilson, Sons & Co.
Dunkirk, 142 pks. 754 bgs. "
" 1,533
Hamburg,46cks. Wilson,Sons & Co.
Rotterdam,2 pkgs. G.Lawson&Sons
Bremen, 5 bins. Veltmann & Co.
Stettin, 12 cks.
**Copper Sulphate—**
Hamburg, 2 cks. J. Good & Sons
**Dyestuffs—**
**Alizarine**
Rotterdam, 36 pks. G.Lawson&Sons
" 74 cks. W.& C.L.Ringrose
" 4 Hutchinson & Son
" 12 G. Lawson & Sons
" 26 W. & C. L. Ringrose
**Dextrine—**
Hamburg, 20 bgs. C. M. Lofthouse and Co.
**Glucose—**
Rotterdam,40 bgs. G. Lawson & Co.
Hamburg, 22 cks.
" 10 Bailey & Leetham
" 10
New York, 1 brl.
Hamburg, 8 cks.
" 400 bgs. C. M. Lofthouse and Co.
" 17 cks. Earle & Haller
**Guano—**
Lysekil, 2,515 bags.
**Glycerine—**
Amsterdam,7 pkgs. W. & C. L. Ringrose
**Glauber Salts—**
Bremen, 60 cks.
**Manure—**
Hamburg,88 cks. Wilson,Sons & Co.
" 200 bgs. "
" 850
Ghent, 100 tons.
**Waste Salt**
Hamburg, 107 bgs. J. W. Hill
" 170
" 500
**Kainit**
Hamburg, 500 bgs.G.Lawson & Sons
" 500 C.M.Lofthouse & Co.
**Naphtha Residues—**
Libau, 1 brl. Morley, Clarke & Co.
**Saltpetre—**
Hamburg,50bgs. Wilson,Sons & Co.
**Soda—**
Rotterdam, 12cks. W. & C. L. Ringrose
**Tartaric Acid—**
Rotterdam, 6 cks. G.Lawson & Sons
" 3 "
" 3

## TYNE.

*Week ending May 12th.*

**Alumina Sulphate—**
Hamburg, 20 cks. Tyne S. S. Co.
" 20 "
**Barytes—**
Rotterdam, 45 cks. Tyne S. S Co.
**Copper Sulphate—**
Hamburg, 3 cks. Tyne S. S. Co.
**Chemicals** *(otherwise undescribed)*
Hamburg, 2 cs. Tyne S. S Co.
**Copper Precipitate—**
Huelva, 354 tons. Scott Bros.
**Glucose—**
Hamburg, 33 cks. Tyne S. S. Co.
" 40 bgs. "
Rotterdam, 100 "
Hamburg, 25 "
" 33 cks. "
**Glycerine—**
Hamburg, 1 dm. Tyne S. S. Co.
**Manure—**
**Phosphate Rock**
Coosaw,420 t. Blaydon Chemical Co.
**Bones**
Christiania, 420 bgs.
**Pyrites—**
Pomaron, 1,188 t. Mason, Barry & Co.
Huelva, 1,567 Scott Bros.
**Salt—**
Hamburg, 20 bags. Tyne S. S. Co.
" 5
**Sugar of Lead—**
Hamburg, 9 cks. Tyne S. S. Co.
**Soda—**
Antwerp, 10 cks. Tyne S. S. Co.
**Zinc Oxide—**
Terneuzen, 50 brls.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 8th.*

**Ammonia Sulphate—**
Canaria, 6 t. £75
Ghent, 343 bags. 340
Hamburg, 1,000 1,300

**Ammonia Carbonate—**
Paris, 2 t. 9 c. £81
Monte Video, 1 28
Brussels, 11 14
St. Petersburg, 10 t. 3 c. 265
Bremen, 4 cks. 30

**Arsenic—**
Melbourne, 13 t. 19 c. £183

**Acetic Acid—**
Smyrna, 20 cks. £60

**Aluminous Cake—**
Lisbon, 12 t. 19 c. £50

**Cream Tartar—**
Melbourne, 10 c. £63
Adelaide, 5 30
Auckland, 5 33
St. John, N.B., 1 t. 1 133
Dunedin, 15 97
Cape Town, 4 24
Brisbane, 10 c. & 15 cs. 170
Sydney, 25 pkgs. 10 t. 1,780

**Camphor—**
Sydney, 4 cs. £25

**Chemicals** *(otherwise undescribed)*
Rio Janeiro, 12 dms. £44
Valparaiso, 31 pkgs. 70
Melbourne, 7 41
Barcelona, 2 cs. 24
Calcutta, 27 pkgs. 150
Colombo, 4 26
Mauritius, 26 89
New York, 2 t. 5 c. 99
Genoa, 10 30
Toronto, 1 7 110
Rosario, 20 kgs. 30
Sydney, 29 pkgs. 5 cs and 2 t. 4 c. 269
Taganrog, 2 kgs. 2 cks. 40
Yokohama, 2 cs. 153

**Carbolic Acid—**
Yokohama, 10 cs. £71

**Citric Acid—**
Adelaide, 8 c. £69
Hamburg, 5 cs. 58
St. Petersburg, 2 t. 10 c. 415
Cape Town, 3 25
Constantinople, 1 kg. 10
Rotterdam, 2 19
Seville, 10 c. 86
Barcelona, 4 cks. 168
Genoa, 10 c. 90
Brussels, 5 42
Antwerp, 10 84
Yokohama, 6 kgs. 53

**Copper Sulphate—**
Dunkirk, 4 t. 19 c. £115
Barcelona, 2 5 50
Galatz, 1 5 26
Sydney, 1 0 21
Paris, 5 8 120

**Carbolic Disinfectant—**
Melbourne, 6 cs. £26
Sydney, 5 pkgs. 16

**Caustic Soda—**
Melbourne, 20 t. 16 c. & 4 dms. £224
Brisbane, 15 12 111

**Caustic Potash—**
Melbourne, 3 t. 19 c. £80

**Collodion—**
Sydney, 2 cs. £24

**Disinfectants—**
Hamburg, 2 t. £12

**Guano—**
Paris, 8 t. £32
Valencia, 9,474 bgs. 5,320
Lauderneau, 305 t. 3,050
Dominica, 14 19 c. 188

**Hydrocarbon—**
Brussels, 4 t. 7 c. £44

**Iodide Potassium—**
Gothenburg, 1 c. £55

**Manure—**
Jersey, 17 t. £51
Rouen, 26 130
Canaria, 9 t. 10 c. 59
Antigua, 10 16 110
Wellington, 30 128
St. Lucia, 177 6 1,739
Christiania, 15 75

**Manure**—*continued.*
Gothenburg, 49 t. 8 c. £167
Demerara, 90 & 350 bgs. 456
Auckland, 125 800 925
Malaga, 26 3 c. 235
Valencia, 1,247 19 11,136
Grand Canary, 25 212
Martinique, 50 500
Libau, 10 36

**Nitric Acid—**
Jersey, 24 pkgs. £65

**Oxalic Acid—**
Paris, 9 t. 14 c. £290

**Potassium Sulphate—**
Bordeaux, 3 t. 15 c. £70

**Phosphorus—**
Melbourne, 23 cs. £231
Sydney, 25 251

**Potassium Bichromate—**
Taganrog, 15 c. £34

**Phosphoric Acid—**
Demerara, 14 t. 13 c. £260

**Potassium Prussiate—**
Yokohama, 35 kgs. £116

**Saltpetre—**
Melbourne, 5 t. £98
Rio Janeiro, 16 7 c. 368
Lisbon, 6 125
Oporto, 4 2 91
Sydney, 2 10 54

**Soda Crystals—**
Sydney, 41 t. 5 c. £97
Auckland, 10 25
Fremantle, 5 4 19
Melbourne, 2 11 13

**Salammoniac—**
Adelaide, 10 c. £18
Antwerp, 2 t. 64
Melbourne, 1 2 34

**Sheep Dip—**
Algoa Bay, 200 cs. £560

**Sulphur, Flowers—**
Madeira, 80 brls. £64
Cape Town, 45 pkgs. 12 t. 14 c. 186

**Sodium Bicarbonate—**
Auckland, 2 t. £11
Melbourne, 20 100

**Sodium Silicate—**
Melbourne, 10 t. 10 c. £58

**Sodium Sulphide—**
Dunedin, 2 t. 5 c. £20

**Sodium Sulphate—**
Lisbon, 20 t. 5 c. £36

**Sheep Wash—**
Amsterdam, 24 cs. & 31 pkgs. £210

**Strontia Nitrate—**
Boston, 3 t. 15 c. £106

**Saccharum—**
Sydney, 11 t. 2 c. £242

**Sodium Hyposulphite—**
Sydney, 1 t. 19 c. £11

**Tartaric Acid—**
Melbourne, 1 t. 5 c. £213
Adelaide, 10 82
Auckland, 10 87
Dunedin, 5 43
Sydney, 3 511
Gibraltar, 1 pkg. 1

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## LIVERPOOL.

*Week ending May 9th.*

**Arseniate Soda—**
East London, 17 c. £21
Boston, 4 t. 40
San Sebastian, 9 c. 6

**Alum—**
Alexandretta, 4 t. 12 c. £21
Venice, 1 1 5
Patras, 2 10 12
Sao Paulo, 1 10 10
Boston, 9 14 56
Alexandria, 30 1 180
San Francisco, 20 2 89
Riga, 8 11 51

**Arsenic—**
Rio de Janeiro, 4 t. 2 c. £53
Smyrna, 1 18 1 q. 20

**Alumina Sulphate—**
Rouen, 5 t. £27

**Ammonia Salt—**
Vera Cruz, 2 c. 3 q. £6

**Acetate of Lead—**
Vera Cruz, 8 c. £13

**Arsenic Acid—**
New York, 11 t. 4 c. 2 q. £101

**Ammonia Muriate—**
New York, 8 t. 12 c. £215

**Ammonia Sulphate—**
Montreal, 10 t. 4 c. 3 q. £130
Valencia, 156 1 0 1821
Bilbao, 6 1 1 74
Las Palmas, 3 0 3 36

**Acetic Acid—**
Vera Cruz, 2 t. 5 c. £40

**Bleaching Powder—**
Bilbao, 32 brls.
Bombay, 6 cs.
Bordeaux, 5 cks.
Boston, 88 tcs. 929 cks.
Calcutta, 60 cs.
Genoa, 112 tcs. 242 brls.
Havre, 25 cks.
Madrid, 18
Montreal, 54 tcs. 34 brls. 6 pkgs. 34 cks. 6 cs.
Malaga, 30 brls.
New York, 167 cks. 15 bxs.
Rouen, 38
Syra 10
Ternewzen, 55
Vera Cruz, 20 cks 7 brls.
Vigo, 25 brls.

**Bone Waste—**
Rouen, 1 t. 19 c. £12

**Borax—**
Malaga, 1 t. 1 c. 2 q. £38
Rotterdam, 3 brls. 8

**Barytes—**
Constantinople, 2 t. £7

**Carbolic Acid—**
Genoa, 13 c. £83
Progreso, 1 cs. 5
Rouen, 3 t. 17 c. 396
Boston, 10 56
Rotterdam, 5 40
New York, 2 10 303
Shanghai, 11 32

**Carbolic, Solid—**
Marseilles, 25 t. 16 c. £2,998
Montreal, 10 c. 1 cs. 47

**Caustic Soda—**
Alexandria, 180 dms.
Algiers, 15
Algoa Bay, 5 bxs.
Alicante, 40
Ancona, 30
Bahia, 20
Barcelona, 200
Bari, 38
Batoum, 52
Boston, 600
Bremen, 17
Brisbane, 20
Corunna, 29 brls.
Cape Town, 34
Carril, 20
East London, 2 cs.
Galatz, 105
Genoa, 55
Gothenburg, 22
Havre, 29
Leghorn, 33
Lisbon, 15 cks. 81
Libau, 18
Malta, 20
Malaga, 15
Melbourne, 42
Marseilles, 300
Messina 35
Montreal, 50 pkgs. 55
Odessa, 25
Naples, 10
New York, 70 brls. 330
Oporto, 15
Norrkoping, 5
Philadelphia, 197
Puerto Cabello, 12
Riga, 36
Rotterdam, 6
Rouen, 331
San Francisco, 100
San Sebastian, 25
Santos, 6
Sydney, 117
Seville, 148
Stettin, 120
Trieste, 14
Valparaiso, 50
Vigo, 12 brls.
Venice, 5

**Charcoal—**
Nantes, 20 t. £80
Hamburg, 43 180

**Copperas—**
Syra, 9 t. 10 c. £19
Galatz, 5 8 12
Constantinople, 13 32
Piræus, 2 18 7

**Calcium Chloride—**
Sydney, 3 t. £5

**Chemicals** *(otherwise undescribed)*
Montreal, 2 t. 3 c. £70
Dantzic, 5 0 2 q. 151
Antwerp, 5 2 154
Stettin, 104 6 1 867
Rotterdam, 5 3 9
Havre, 75 4 0 510
Riga, 5 2 8

**Copper Sulphate—**
Venice, 4 cks. £21
Genoa, 11 t. 17 c. 250
Riga, 12 3 q. 11
Rouen, 30 19 1 646

**Caustic Potash—**
New York, 2 t. 9 c. 2 q. £48
Montreal, 6 6
Stettin, 18 16

**Cream Tartar—**
Halifax, 1 t. 4 c. £139

**Citric Acid—**
Malaga, 2 c. £18
Cadiz, 2 20
Valparaiso, 500 lb. 38

**Carbonate of Lime—**
Lisbon, 2 t. 12 c. £15

**Dunging Salt—**
Boston, 6 t. £70

**Disinfecting Powder—**
Bombay, 5 t. 14 c. £30
Calcutta, 2 10 48

**Epsom Salts—**
Barcelona, 20 bgs.
Montreal, 25 kgs.
Rio Janeiro, 40

**Guano—**
Cullera, 250 t. £2,050

**Indigo—**
Boston, 7 c. £10

**Magnesia—**
Rio Janeiro, 10 cs.

**Manure—**
St. Nazaire, 1 t. 19 c. 3 q. £6
Grand Canary, 2 6

**Magnesium Chloride—**
Bombay, 11 t. £87

**Naphtha—**
Ghent, 5 cks.

**Oxalic Acid—**
Barcelona, 2 t. 12 c. 2 q. £73
Marseilles, 12 1 19

**Oxalate Potash—**
Boston, 13 t. £489
Genoa, 3 15 c. 2 q. 120

**Phosphorus—**
Monte Video, 1 c. 3 q. £18
Vera Cruz, 8 60
Hong Kong 1 15

**Potassium Chlorate—**
Malta, 12 c. £20
Hong Kong, 10 30
Boston, 2 t. 10 134
Gothenburg, 3 178
Hamburg, 10 57
Santos 1 10 85
Buenos Ayres, 1 16 90
Bari, 1 60
Philadelphia, 5 268
Rotterdam, 1 55
New York, 25 8 1,210
Copenhagen, 6 32
Monte Video, 2 3 q. 9
Gulujewsky, 1 9 75
Montreal, 10 85

**Picric Crystals—**
Hamburg, 2 t. 12 c. £407

**Potashes—**
Genoa, 11 c. £13
Havana, 4 2 q. 9

**Potassium Bichromate—**
Bilbao, 6c. £13
San Sebastian, 1 t. 4 c. 1 q. 50

**Potassium Prussiate—**
Bilbao, 6c. £20

**n Carbonate—**
:o, 3 t. 7 c. £90
14 233
**n Chromate—**
t. £350
300 t.
1,650
200 brls.
**ı—**
364 cks.
rres, 300
15 brls.
85
16 cks.
ı, 55 brls.
leo, 150
5 cks.
100 tcs. 72
10 pps.
, 527 tcs. 369 cks.
32
20 brls.
ıia, 426 tcs. 114 cks.
'o, 50 brls. 34
:isco, 37
2 cks. 10 brls.
100
126
t 20
a, 21
**rstals—**
23 brls.
140
40
106
6
deo, 24
3 cs. 125 cks. 50 brls.
75 brls.
100
n, 25
35 cks.
50 brls.
ɔ, 10 cks.
40 brls.
20
30 t.
497
10
235
231
313
140
11,835
ns, 80
130
ıt, 585
10
g, 320
170
arg, 10
2,122
n, 270
328
aya, 400
421
, 1,821
ing, 177
k, 130
bar, 150
m, 175
eone, 7
30
**Bicarbonate—**
'ia, 50 brls.
50 kgs.
g, 100 173 brls.
18
, 40 6 cks.
29
l, 1,375
'k, 533
220
20
50 brls.
'sburg, 1,205 kgs.
60
100 kgs. 86 brls.
ı, 50 kgs.
na, 1,250
**Silicate—**
'wn, 5 brls.
13
11 cks.
4 brls.
er, 25 cks.
30
**Sulphate—**
re, 9 t. £36
**re—**
2 t. 9 c. £51
ıl, 70 10 216
1 6 28
6 129
**Wash—**
2 t. 5 c. 1 q. £87

**Sugar of Lead—**
Montreal, 7 cks. £68
**Sodium Phosphate—**
San Sebastian, 12 c. £10
**Sheep Dip—**
Monte Video, 3 t. 15 c. £83
East London, 6 1 q. 10
Algoa Bay, 1 2 2 45
Cape Town, 2 17 96
**Salammoniac—**
Mersyne, 3 c. 1 q. £5
Hamburg, 1 t. 3 2 40
Bilbao, 8 12
Trieste, 16 33
**Soap Leyes—**
Rouen, 6 t. 5 c. £75
**Sodium Acetate—**
Vera Cruz, 2 c. £3
**Soap Powder—**
Cape Town, 1 t. 4 c. 3 q. £43
New York, 5 5 90
Antwerp, 2 70
**Sulphur—**
Santos, 2 t. 9 c. £16
Halifax, 3 13 2 q. 29
Gothenburg, 5 2 2 22
**Sodium Nitrate—**
Shanghai, 5 t. 0 c. 2 q. £50
Copenhagen, 2 11 3 35
Seville, 2 18 27
Malaga, 6 8 2 68
**Sodium Stannate—**
St. John, N.B., 1 t. 5 c. £48
**Sodium Chlorate—**
Vera Cruz, 9 c. £5
**Sulphuric Acid—**
Ceara, 15 galls. £5
**Sodium Hyposulphite—**
East London, 13 c. £5
**Tartaric Acid—**
Malaga, 2 c. £17
**Tartar Emetic—**
Vera Cruz, 5 c. 3 q. £35
**Tin Crystals—**
Vera Cruz, 5 c. 3 q. £24
**Zinc Oxide—**
Maranham, 9 c. 3 q. £12
Ghent, 5 7

## GLASGOW.

*Week ending May 12th.*

**Ammonia Sulphate—**
Trinidad, 6 t. 15 c. £90
Demerara, 134 brls. 246
" 111 t. 14 c. 1,340
**Bleaching Powder—**
Sydney, 20 t. 2 c. £181
Melbourne, 15 9 111
**Chloroform—**
Sydney, 2 cs. £25
**Copperas—**
Kurrachee, 8 t. 9 c. £20
**Dyestuffs—**
**Aniline**
Bombay, 1 c. £20
**Indigo Extract**
Quebec, 17½ cwt. £36
**Argol, Ground**
Quebec, 1 t. 4 c. £24
**Disinfectant—**
Quebec, 2½ c. £21
**Iodine—**
Rotterdam, 2 cks. £715
" 3 775
**Manure—**
Trinidad, 52 t. 5 c. £647
Demerara, 103 3 1,400
**Slag Phosphate—**
Trinidad, 500 bgs. £100
**Potassium Bichromate—**
Gothenburg, 1 t 1 c. £47
Rotterdam, 1 ck. 16
Boston, 8 t. 2 c. 340
New York, 13 3 553
Melbourne, 3 18 168
Christiania, 2 cks. 31
**Paraffin Wax—**
Gothenburg, 13 t. 11 c. £169
Melbourne, 34 12 772
**Pitch—**
Sables d'Olonne, 731 t. £440
Galatz, 1,550
**Potassium Prussiate—**
New York, 6 t. 2 c. £352
**Soda—**
Sydney, 9 t. 15 c. £39
**Sulphuric Acid—**
Kurrachee, 6 t. 8 c. £32
Surinam, 19 carboys. 7

**Sugar of Lead (brown)—**
Bombay, 2 t. 2 c. £40
**Sodium Bichromate—**
Gothenburg, 18 c. £25
Rotterdam, 56 cks. 420
Boston, 9 t. 18 c. 323
New York, 4 6 141
Rotterdam, 111 cks. 825
**Sulphur—**
Surinam, 15 brls. £20

## HULL.

*Week ending May 8th.*

**Alkali—**
Bergen, 10 cks.
Trieste, 7
**Bleaching Powder—**
Antwerp, 58 cks.
Christiania, 1
Reval, 31
Stettin, 167
**Bone Size—**
Harlingen, 24 cks.
**Barytes Carbonate—**
Stettin, 202 t.
**Chemicals** *(otherwise undescribed)*
Antwerp, 6 cs. 10 cks.
Amsterdam, 10 cks.
Bari, 21 kgs.
Bergen, 1 cs. 30 cks.
Bombay, 137 pks. 108 cks.
Bremen, 22 cs.
Christiania, 33 cks. 19 cs.
Constantinople, 100 cks.
Copenhagen, 1 ck. 18 cs.
Dantzic, 25 pks. 27 cks.
Gothenburg, 50 pks. 1 ck. 9 cs. 100 t.
Ghent, 14 pks.
Hamburg, 14 pks. 58 cks. 26cs.
Konigsberg, 6 pks. 3 cks.
Libau, 200 pks. 7 cks.
New York, 35 cks.
Odessa, 192 cks. 30 pkgs.
Reval, 1 cs.
Rouen, 22 cks.
Riga, 119
Rotterdam, 50 cks. 16 pkgs. 10 cs.
Stockholm, 14 pkgs.
Stettin, 46 cks. 73 pkgs.
Trieste, 38 cks.
Venice, 20
**Caustic Soda—**
Bari, 90 dms.
Hamburg, 19
Konigsberg, 74
Libau, 36
Riga, 697
Trieste, 10
**Dyestuffs—**
Boston, 23 cks.
Dunkirk, 80 bgs.
Hamburg, 1 pkg. 2 cs. 1 ck.
Reval, 42 cks.
Rotterdam, 4 kgs. 2 cks.
**Manure—**
Antwerp, 452 bags.
Dunkirk, 100
Hamburg, 1,016
Nakskov, 396 tons.
Riga, 1,000 bgs.
Stettin, 300
**Pitch—**
Antwerp, 500 t.
**Tar—**
Antwerp, 149 t.
Bergen, 1 ck.
Christiania, 1 ck.
Copenhagen, 11 cks.
Hamburg, 15
Rotterdam, 2

## TYNE.

*Week ending May 12th.*

**Alkali—**
Riga, 8 t. 8 c.
St. Petersburg, 129 15
Antwerp, 1 15
Amsterdam, 57 10
Christiania, 5 8
Dantzic, 1 2
Rotterdam, 1 13
**Alum—**
Odense, 6t. 10 c.
**Antichlor—**
Helsingfors, 3 t. 11 c.
**Bleaching Powder—**
Lisbon, 6 t. 16 c.
Norrkoping, 38 12
Hamburg, 27 17
Riga, 68 3
**Bleaching Powder—***continued*
Copenhagen, 2 t. 0 c.
Antwerp, 30 8
St. Petersburg, 669 13
Amsterdam, 49 1
Christiania, 32 11
Dunkirk, 6 13
Helsingfors, 97 18
Dantzic, 17 3
Rotterdam, 51 19
Abo, 0 7
Stettin, 49 16
**Barium Carbonate—**
Hamburg, 2 t.
Stettin, 15
St. Petersburg, 10
**Barytes—**
Stettin, 100 t.
**Caustic Soda—**
St. Petersburg, 101 t. 19 c.
Gothenburg, 13 8
Antwerp, 8 9
Aalborg, 5 17
Christiania, 2 0
Dantzic, 0 12
Stettin, 0 17
St. Petersburg, 129 15
Copenhagen, 33 14
**Copperas—**
Aalborg, 2 t. 9 c.
Abo, 21 10
Veile, 2 13
**Flint (Ground)—**
Ronne, 1 t. 11 c.
**Glauber Salts—**
Abo, 2 c.
**Iron Sulphide—**
Ergastiria, 1 c.
**Litharge—**
Gothenburg, 1 t. 7 c.
Hamburg, 2 11
Riga, 11 6
Antwerp, 0 11
Helsingfors. 0 2
St. Petersburg, 18 9
**Magnesia—**
Hamburg, 2 c.
Antwerp, 1
**Manure—**
Riga, 148 t. 9 c.
**Magnesium Carbonate—**
Dantzic, 5 c.
**Potassium Chlorate—**
Hamburg, 1 t. 2 c.
Riga, 3
Antwerp, 11
Abo, 7
Rotterdam, 1 15
St. Petersburg, 18 0
Malmo, 4 0
**Phosphorus—**
Malmo, 8 c.
**Paraffin Wax—**
Malmo, 10 t. 10 c.
**Soda Ash—**
Gothenburg, 34 t. 15 c.
Lisbon, 31 12
Hamburg, 9 1
Aarhuus, 1 2
Ergastiria, 0 11
Lisbon, 15 19
Christiania, 5 7
Helsingfors, 1 6
Dantzic, 81 19
Rotterdam, 19 19
Stettin, 15 3
**Soda—**
Nakskov, 8 t. 2 c.
Norrkoping, 287 6
Antwerp, 5 1
Karrebœksminde, 16 1
Lisbon, 11 4
Stockholm, 30 7
Odense, 44 15
Jersey, 5 10
Randers, 20 10
Harlingen, 100 2
Amsterdam, 34 4
Rotterdam, 65 8
Middlefart, 80 8
**Sodium Bicarbonate—**
Hamburg, 2 t.
Antwerp, 2 2 c.
Amsterdam, 3 19
Dantzic, 6 10
St. Petersburg, 10 0
**Sodium Sulphate—**
Dantzic, 20 t.
St. Petersburg, 59 13 c.
**Sodium Hyposulphite—**
Rotterdam, 2 t. 3 c.
Stettin, 1
**Salammoniac—**
St. Petersburg, 42 t. 3 c.

# PRICES CURRENT.

[THURSDAY, May 17, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 8 | 9 |
| ,, Glacial | per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 12 | 0 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 3¾ |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2¼ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3 |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (monohydrate) | ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6 |
| Arsenic, white powdered | per ton | 11 | 7 | 6 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3⅛ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3⅛ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 42 | 10 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 11 | 10 | 0 |
| ,, ,, (grey), Hull | ,, | 11 | 7 | 6 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8¼ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 5 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 11 | 10 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 2 | 10 |
| ,, 50/90 ,, | ,, | 0 | 2 | 4 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2 |
| ,, (crude 60°) | per gallon | 0 | 3 | 11 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2⅛ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 0 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 11 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 82 | 10 | 0 |
| ,, Sulphate | ,, | 21 | 0 | 0 |
| ,, Oxide (copper scales) | ,, | 75 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 2 | 0 | 0 |
| Lead (sheet) for cash | ,, | 13 | 10 | 0 |
| ,, Litharge Flake (ex ship) | ,, | 16 | 0 | 0 |
| ,, Acetate (white, ,, ) | ,, | 25 | 10 | 0 |
| ,, ,, (brown, ,, ) | ,, | 20 | 15 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 10 | 0 |
| ,, Nitrate | ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 8 | 7 | 6 |
| ,, ,, (grey) | ,, | 12 | 10 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 17 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 2 | 0 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent | ,, | 0 | 3 | 10 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | 1 |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 3 | 0 |
| Cotton-seed | per ton | 22 | 0 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 6 |
| ,, American | ,, | 0 | 0 | 6⅛ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 5¾ |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 9 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 6¾ |
| ,, Sulphate, 90 % | per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % | ,, | 7 | 15 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 6½ |
| ,, Nitrate | ,, | 0 | 2 | 7½ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) | ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 19 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 30 | 0 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 7 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 11 | 3 |
| ,, Bicarbonate | ,, | 5 | 0 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, 30/33 | ,, | 10 | 0 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 6 |
| ,, Nitrite, 98% | per ton | 28 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 5 | 0 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 0 | 0 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 10 | 0 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 13 | 3 |
| ,, Cane | ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 7½ |
| ,, Barium | ,, | 0 | 0 | 5 |
| ,, Copper, 60% | ,, | 0 | 0 | 8½ |
| Sulphur (Flowers) | per ton | 8 | 12 | 6 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 5 | 0 |
| Tallow | ,, | 26 | 0 | 0 |
| Tin (metal) | ,, | 85 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 6⅛ |
| Zinc (Spelter) | per ton | 16 | 15 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 12 | 6 |

# Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, May 26, 1888.**


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## Notices.

mmunications for the *Chemical Trade Journal* should ssed, and Cheques and Post Office Orders made to—

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s, reports, and correspondence on all matters of to the Chemical and allied industries, home and are solicited. Correspondents should condense their s much as possible, write on one side only of the d in all cases give their names and addresses, not ly for publication. Sketches should be sent on sheets.

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s one of the special features of the *Chemical Trade* to give the earliest information respecting new s, improvements, inventions, etc., bearing upon the l and allied industries, or which may be of interest aders, the Editor invites particulars of such—when ng order—from the originators; and if the subject is of sufficient importance, an expert will visit and pon the same in the columns of the *Journal*. There required for visits of this kind.

hall esteem it a favour if any of our readers, in nquiries of, or opening accounts with advertisers in r, will kindly mention the *Chemical Trade Journal* as e of their information.

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## THE PAYMENT OF JURORS.

TRIAL by Jury is generally supposed to be one of the fairest methods of meting out justice in a court of law. The process is too well known to require description, but to those who are not in the habit of looking beneath the surface of things, it may not seem strange or incongruous to select twelve men haphazard and to place one's fortunes, for good or evil, entirely in their hands.

Very few people will, we think, venture to deny that the system of trial by jury is to some extent an advance on the old-fashioned method of walking over red-hot ploughshares or sharpened sword blades, still the contrary decisions which are constantly being given in the various courts of appeal should be quite sufficient to show us that our present system is by no means perfect. In fact by innuendo a positive distrust of the jury system has for many years shown itself in the administration of justice in our courts of law. Some cases are tried before a judge without a jury, while in others a special jury is selected, from which it would seem that the litigants are distrustful of receiving justice at the hands of a common jury, though it is quite certain that this is not so.

The expansion of modern trade, the haste to grow rich, the disposition to adhere to the letter of a contract rather than its spirit, the increase of speculation and the endeavour to shelve bad or non-paying bargains has opened up quite a new field to the legal profession; and as such is the case the process of trial by jury deserves to be looked at from the new standpoint.

These remarks have been prompted by the reply of the Attorney-General to a question addressed to him in the House of Commons by Mr. G. Elliott. He said:—

"I am well aware that common jurors have to incur "considerable expense in travelling and in other ways. At "the same time, it is a very difficult question whether it is "or is not desirable to give them substantial remuneration. "The distinction between common jurors and special jurors "rests upon statute law. I am not prepared to say that I "will introduce a measure dealing with this question, but I "recognise that it will have to be considered in the event of "any large alteration of the existing law."

In the event of any alteration of the existing law it would be well if some very distinct line of demarcation could be drawn between criminal and civil business. So far as criminal matters are concerned, and so long as no expert evidence (or rather we may say experts' opinions) is tendered, and when the jury have only questions of fact to decide, the trial by twelve good men and true may, perhaps, be one of the best institutions we have to ensure justice being done.

Where offences are committed against the laws of the realm, as distinguished from private or commercial squabbles in which the litigants alone will be the gainers and losers, there should be some distinction as to the remuneration of jurors. A good citizen should not object to serve his country for the adjustment of criminal matters, but, on the other hand, all those who have been fortunate enough to escape the jury panel should not object to contribute their quota in the shape of taxes for the payment of out-of-pocket expenses of the less fortunate ones who are obliged to leave their ordinary business vocation at the command of the law.

But can this argument be applied when commercial matters are taken into the law courts? We think not. If Mr. Black enters into a bargain with Mr. White, and afterwards they cannot settle the details of the business themselves, why should twelve other men be compelled to leave their daily work in order to settle Messrs. Black and White's differences without being well paid for their trouble? The fact is, that many of these cases could easily be settled outside a court of law, but after the passage of a few

"lawyers' letters," the poor fly walks so unconsciously into the spider's web that no amount of arbitration would settle the matter without the assistance of a judge and jury. Under these conditions we think that if the litigants desire the jury's services they should be made to pay handsomely for them.

The greatest joke about these commercial cases is that both plaintiff and defendant are always so confident of winning the suit that they do not seem to care what expenses are run up for the other side to pay; but sometimes, and not infrequently, the prophet is not inspired with the spirit of truth, and each side is left to pay the expenses of its own creation. This, of course, is nothing to do with the jury, but where there is so much loot about it seems rather hard lines that the jurymen should not come in for a fair share of the spoil.

We are not without some experience of the trial of commercial squabbles in courts of law, both with and without a jury, and we have come to the conclusion that if two good men of business happen to fall out on any commercial matter, a cheaper and quite as sensible and certain a process of settlement would be to post a notice outside the office door—"Wanted twelve men to settle a dispute inside; remuneration one guinea; education no object." Will any of our readers try our plan, and report the result to us?

## CHEMICAL ENGINEERING.*

II.

I HAVE been in the habit for some time of working out processes by what I call "a technical experiment," named so to keep the results distinct from the "large scale experiment" on the one hand, and the "laboratory experiment" on the other, and I am able to say with confidence that if the technical experiment be carried out with intelligence, it will give results almost absolutely identical with what can be obtained on the industrial scale.

No doubt many of you will have heard the expression as often as I have—"It may be done in the laboratory, but cannot be managed in the works." Performing the operation in the laboratory usually implies the manipulation of but a few grammes of the substance, and the physical conditions have been so well cared for that success has resulted. Now, if those conditions had been as well cared for in the works, think you not that success would have appeared there also? I say most undoubtedly it would, but at the same time the commercial element steps in and tells us often that it will not pay to do a thing as completely on the large scale as we may be able to do it in the laboratory. All these things have to be very well studied, in the abstract as well as the concrete, for I cannot imagine that anyone would engage in manufacture without he fancied he saw a good pecuniary return for his investment.

I had in my mind's eye a few moments ago an excellent example of the things which can be done in the laboratory, and yet would scarcely pay to effect on the large scale. I allude to the process of economising the waste heat in our boiler flues to a greater extent than is at present being done. In a future lecture I hope to be able to show you the small return there would be for any outlay in this direction, so as to point out a moral to the statement I have already asked you to accept—that operations can be quite as readily carried to success in the works as in the laboratory if the cost of the various operations is left out of consideration altogether.

I must now return to the subject of "technical experiments." There should be no difficulty in any technical laboratory in dealing with a few kilogrammes of raw material, and it is in dealing with such quantities that we get some insight into the difficulties of large scale working. I can give you an instance of what I mean by reference to some experiments I carried out some years ago on the manufacture of commercial phosphoric acid. Some manufacturers about the year 1878 sought my advice respecting the making of this article, and many experiments were made on the decomposition of various phosphates by means of sulphuric acid.

The conditions of sale were that not more than 2 per cent. of sulphuric acid should be present in the finished acid of 150° Tw., and at the same time be practically free from lime salts. Under such conditions as these it would have been folly to have erected new plant until the feasibility of the process had been ascertained, and on the other hand it would have been equally foolish to have depended entirely on laboratory experiments. In a laboratory experiment, as I have said before, only a few grammes of the substance are operated upon, and every care is taken to extract the whole of the substance required. For this purpose solutions of salts mixed with substances in suspension are thrown upon a filter and washed, without any regard to the quantity of wash water employed. On the large scale this is one of the most vital portions of the problem, for the evaporation of solutions requires coal, and coal is a very important item in the conduct of any manufacture.

Instead of pouring out the cup to its dregs, you must stop short of this, and take off the clear liquor by decantation, putting the residue through a vacuum filter or into a filter press, where the solid matter is washed after expression of the original solution. Anyone will be able to see what a vast difference there is likely to be between the two methods of working, the second approximating very closely to working on the large scale, inasmuch as only a practicable quantity of water is used for washing, in order not to unduly weaken the solution.

Having now obtained a solution equivalent to what would be produced on the large scale, it was necessary to analyse it and see what it contained; it was found to contain both sulphuric acid and lime, in combination with acids in considerable proportion when reckoned upon the amount of phosphoric acid present. Now chemistry by itself points to the probability of both lime and sulphuric acid being removed at a future stage if they are present in equivalent quantities in the solution, but it is not certain, neither is it possible to predict in what form it will be eliminated, if that separation actually takes place. Chemistry alone, however, exhibits the finger-post of caution to the chemical engineer by teaching him to be on the look out, and what to expect. In this special case sulphuric acid was added to the solution about to undergo evaporation, until there was one equivalent present for every equivalent of lime. No immediate precipitation occurred, but the sulphate of lime formed a very hard deposit on the sides of the evaporating dish during the concentration. Practically, it was found that 90 per cent. of the sulphate of lime was deposited before the liquor had reached 60° Tw., and 98 per cent. at 90° Tw.

Having discovered this, it was comparatively an easy task to design plant for the manufacture; the ground phosphate was treated in lixiviating vats with a weak sulphuric acid of 20° Tw. After the reaction had taken place during constant agitation, the sulphate of lime which had been formed was allowed to settle and the clear solution boiled down in a steam-jacketed pan from 11° Tw. to about 50° Tw. It was then allowed to cool and settle, during which operations above 80 per cent. of the sulphate of lime held in solution was eliminated. The clear liquor being drawn off, was again concentrated to 90° Tw., and again allowed to settle, the clear liquor from this being further boiled down to 150° Tw., when it contained 52 per cent. of anhydrous phosphoric acid, 0·28 per cent. of lime, and 0·52 per cent. of sulphuric anhydride, the remainder being chiefly water, the acid thus meeting the requirements of the purchasers.

But though the quantity of phosphoric acid produced in the technical experiment and on the large scale was nearly identical, still it fell short of the quantity indicated by the laboratory experiment. In actual chemical operations on the large scale, the least expensive constituent is generally used in excess in order to expediate the reaction, and if the agents are only used in equivalent quantities a longer time is required to complete the reaction. In this case excess had to be avoided, for on the one hand an excess of vitriol was injurious, while an excess of phosphate would simply have produced a superphosphate of lime. The losses of the phosphoric acid took place in three directions; the solution entangled amongst the sulphate of lime mud in the decomposing tank, the phosphoric acid entangled amongst the deposit in the first concentrating vessel, and that deposited in the second vessel; but by systematic treatment these losses were soon reduced to a minimum by washing the deposits with a small quantity of water, and placing the solution thus obtained in the first evaporating vessel, the

* A course of lectures delivered by Mr. George E. Davis at the *Manchester Technical* School.—*All rights reserved.*

residue being taken to the decomposing tanks for treatment with a fresh batch of phosphate. The washings from the decomposing tanks were used to dilute the sulphuric acid used in the operation, so that the loss was reduced to a very small amount.

I may now call your attention to another laboratory experiment to illustrate the importance of trials in the manner I have already described. This time we will take the manufacture of sulphocyanides from waste or spent gas water. It has been known for many years that spent gas water from the sulphate of ammonia stills and also the washings from the spent oxide of a gasworks contain notable quantities of sulphocyanides, but though the largest proportion is found in gas water, yet no industrial venture founded on this knowledge has been established in the United Kingdom. I have often been asked whether the manufacture of ammonium sulphocyanide or even the barium salt of this acid is or is not a profitable operation. A "technical experiment" should be able to settle the question, and I say this confidently, as I have myself made large quantities of sulphocyanides from waste liquors. In such a case what is easier than to take about 10 litres of the waste liquor, and to add the precipitating solution to it, to collect the precipitate and to filter press it and wash it in order to free it from the bulk of the solution in which it was thrown down. You will say, perhaps, nothing easier! But in working with these large quantities there will be sufficient to be able to notice the physical character and behaviour of the precipitate; is it light and bulky, or dense and clayey? And the percentage subsidence may be readily observed. This is very valuable information, as it enables one versed in such matters to decide the form of apparatus best suited to the special case as well as its capacity for doing work. And in this operation, the chemistry of the reaction must not be left out of consideration; during the precipitation the copper precipitant undergoes a change of state, it is put into the liquid in the normal or cupric condition, but becomes precipitated in the sub or cuprous form, so that without some more oxidisable matter be present the sulphocyanogen itself will be oxidised and destroyed. This is generally prevented by the simultaneous addition of protosulphate of iron.

The filter-pressed paste of cuprous sulphocyanide can now be assayed and the strength of it will show its worth; but unfortunately there is only a limited outlet for this article and inventors have shown that its best use consists in decomposing it with a soluble sulphide, copper sulphide being formed, the sulphocyanogen combining with the base formerly united to the sulphur. Now, as copper is expensive and has a fairly high equivalent, it has been deemed necessary to recover it so as to make it useful for work over again. A technical experiment on this point will be found very instructive and show us what some patentees have neglected. It seems simple enough to say, roast the sulphide of copper and you will get copper sulphate that can be used over again; but it has been over and over again forgotten that the copper is in the cuprous state and only half of it could be even theoretically reconverted into sulphate and still less practically. Upon gently roasting the recovered sulphide some sulphate is formed and the amount of it can readily be determined. Upon summing up then the results of this "technical experiment," the operator will most probably come to the conclusion that it will be better to sell the sulphide precipitate to the smelter and to charge the process with the loss in value the copper has experienced. A profit and loss account will then show whether the process can stand such a charge.

I will now take another illustration of a different character. Some years ago I essayed to decompose a native phosphate of alumina found on the Islands of Los Roquez, Alta-vela and Redonda, in order to produce direct, a tribasic phosphate of soda. In order to accomplish this, the finely ground phosphate was furnaced with the waste sand from the glass works and soda-ash, tribasic phosphate of soda was produced, soluble in water and a double silicate of alumina and soda, insoluble. The first experiments were performed in the laboratory on two or three kilogrammes of the substance, while afterwards two or three tons were operated upon and the results were practically identical, both as to quantity and quality of the product. The working of the technical experiment showed very clearly the points which had to be watched in operating on the large scale, the mixture under the influence of a considerable degree of heat did not fuse, but simply fritted together, yet the decomposition was practically complete so that it was necessary to ensure proper and adequate mixing of the substances before the charge was placed in the furnace. The apparatus necessary for lixiviation was also foreshadowed in the technical experiment, the product from the furnace contained a very large percentage of insoluable substances, of an open and porous character, and ordinary lixiviating vats, such as are used for black-ash would have been very suitable, and the experience of this industry would have been valuable in the phosphate process.

I have chosen the foregoing illustrations as instances of a simple kind, but have as yet advisedly omitted all reference to one element certainly of the greatest importance in any manufacturing industry—I refer to the quantity of raw material it is possible to put through a given plant in a given time and upon which the cost of production so largely depends. The technical experiment will give an experienced operator a good idea of this, and by analogy with other processes he will be able to calculate to a nicety the size of the apparatus to turn out a given quantity of material and to form a fairly correct opinion as to the cost of labour and fuel. I am afraid it is not possible to lay down any general law in this direction to guide the tyro, there is no royal road to this species of knowledge, which can only be gained with any degree of exactness by careful and patient observation and by practical experience in a variety of directions, still there is a way of going about one's work in chemical engineering, more certain and less expensive than the process of trial and error, and it is to be hoped that those who essay to become chemical engineers will discover the fact that science and practice will work together on all occasions where the conditions have been properly studied. I know that in many chemical works "rule of thumb" is rampant still, but if by putting before you examples of how the same objects may be obtained by a sure and inexpensive process which ensures fewer failures, I feel sure that those methods will be studied and will bear fruit by helping us to cast off a stigma under which we have been long suffering.

*(To be continued.)*

## GLASGOW INTERNATIONAL EXHIBITION.

SECOND NOTICE.

THE progress made by exhibitors between the press-view day and the formal opening on the 8th, turned out to be so satisfactory that quite a finished display was the result. The grouping and classifying of exhibits leave, in the case of this Exhibition, very little room for reasonable regret, and this is really a subject for mutual congratulation when the strange jumble of some earlier international efforts of the kind are called to mind. Admirably compiled also has been the catalogue, with its divisions of sections and classes, and these features, taken in connection with the admired simplicity of the floor space arrangements of the building, conduce in no small measure to the comfort and convenience of visitors. This applies with peculiar force to the Chemical Section, which is wonderfully homogeneous in its constituents, and is besides—judged in the merely spectacular sense—one of the most beautiful and effective within the building. Admirable taste has for the most part been evinced in the stand designs, and in the arrangement and display of the contents; and as chemicals and cognate manufactured products naturally lend themselves to the formation of striking tableaux, the result is one which will attract the gaze of thousands who care little and understand less about the properties of chemicals in the utilitarian sense. In number of exhibits the result greatly exceeds the rather poor promise of the press-view day; still, it is not a crowded section, but one just representative enough and varied enough to be handy and useful for purposes of industrial illustration.

Courts 8, 9, and 10, bordering the main avenue on the south, and the last-named, with a corner look out upon the space under the great dome, are those devoted to chemicals, and the position is about the best in the building. Stand 726 commands almost instant attention, and here we find Peter Spence and Sons, of Manchester and Goole, to the front with a colossal crystal of alum ten tons in weight, of a quality affected for the finest papers, and in special dyeing, calico printing, tanning, and pottery colouring operations. Ground alum also, and makers' special sulphate of alumina for the red liquor of the dyers form part of the show; but perhaps more specially interesting is the firm's illustration of certain possibilities in the purification of sewage and polluted river water. One large glass measure shows a sample (about as black as ink) of Glasgow sewage as it falls

into the Clyde, and another the Clyde water itself (not far behind in point of blackness) as it leaves the harbour on its way to the sea. Other two measures show to what extent these abominations are cleansed after treatment by Spence's alumino-ferric. Grimshaw Brothers, Clayton, Manchester, show on Stand 732 some of their specialities in india-rubber chemicals, with illustrations in the removal of coating of zinc from galvanised scrap-iron, and agents in sizing, bleaching, etc. The recovery of sulphur from alkali works is the chief *motif* of exhibit No. 733 by Chance Brothers, Birmingham; and hard by (Stand 740) Sadler and Co. Limited, of Cleveland Works, Middlesbrough-on-Tees, show some of their very fine dyeing agencies, including alizarine, aniline, and other coal-tar dyes, with specimens of alizarine printed cottons and other fabrics; also acids, alkalies, sodas, and other chemicals. Brunner, Mond and Co., Northwich, in 739B possess a stand of singular elegance of design. Their case contains samples of most of the chemicals with which the name of the firm has been associated, and all apparently of the highest quality. The largest case in court 10 is that containing the joint exhibit of the Newcastle Chemical Works, Charles Tennant, Sons and Co., the Jarrow Chemical Co., and J. G. and W. H. Richardson. It is a group of articles, raw and manufactured, which is very well conceived, and made to cover no little general ground; but the central idea is the illustration of the soda industry of Tyneside under the Leblanc process, and this has been excellently carried out. The big case cannot vie with some of its neighbours in brilliancy of colour, but as here arranged it is of powerful industrial interest, and will be closely examined by all classes. John Riley and Sons, Manchester and Accrington, have at Stand 743 as good a collection of general market chemicals as any, including most of the dyeing and bleaching agencies, with sulphate of copper, oxide of copper, sulphate of zinc, soda crystals, sulphate of soda, etc. There are also some specimens of dyed and printed goods illustrating the action of the sulphated ore of this firm, and these seem to possess very considerable merit. Altogether the case is a highly educative one. In the adjoining exhibit, B. Kuhn and Schroeder, Manchester, have on view some very good samples of coal-tar and other colouring matters for wool, cotton, silk and leather, and including one very fair pattern of fast myrtle dyed on discharged iron mordant. Hardman and Holden, Miles Platting (748), in a large triple case illustrate the production of alizarine from coal-tar, and are profuse with examples of dyed and printed goods (cotton, silk and wool) after alizarine treatment. One of the best selected cases, and amongst the largest, is that of the Widnes Alkali Company, with fine specimens of the ordinary market chemicals, including caustics, chlorate of potash, in crystals and ground, bleaching powder, manganate of soda, etc. This excellent selection is in court 9 on Stand 753, and is being much looked at by those of the visitors who are chemically interested. In the same court, Gaskell, Deacon and Co., Widnes, are conspicuous with a fine sample of soda crystals in block of great purity. It was originally three feet high, but is now some inches shorter. The attendant announces that the companion of this specimen has found a permanent place in Owens College, Manchester. James Muspratt and Sons, Widnes and Liverpool, Stand 765, have a capital show of acids, alkaline products, barium products, and chemicals of the chlorate process, including chloride of magnesium, a beautiful block of which forms the central feature of this case. Tar products are amongst the specialities of an excellent case by Smith and Forrest, Manchester, 768, court 8, who also show a variety of oils—shafting, spindle, machinery, cylinder, and wire rope—all pleasing to the eye. On Stand 783 (Bell Brothers, Middlesbrough) are specimens of ammonia-soda from salt by the Schlœsing process, also articles got during the course of that process, such as bicarbonate of ammonia and bicarbonate of soda, all of which are rather of interest. The chief Scotch exhibitors of chemicals are R. and J. Garroway (sulphates, muriates, and nitrates); the Associated Makers of Bichromates (J. and J. White, the Eglinton Chemical Company and Stevenson, Carlisle and Co.), A. B. Fleming and Co. (printing inks), Charles Tennant and Co. (alkalies, etc.), and J. and J. G. Scott (colours). The Scotch Mineral Oil Companies also form part of the Chemical Section, and there are at least three good displays due to these, particularly that of the Broxburn Company, which, in addition to a beautiful case of finished shale products in court 8, have forward a paraffin candle factory in action at Stand 429 in the machinery annexe. Particularised notice of a selected few of the Scotch exhibits is meanwhile *reserved*.

The mechanical side of chemical science and industry has not been forgotten. Mawson and Swan, Newcastle (807), show balances (Bunge's) and weights of precision for assayers and analysts. J. D. Mitchell and Co., Glasgow, on Stand 1,185, show all manner of vials and bottles, also specimens of capsuling machines; while in the rougher department of ore and quartz crushing the Hardy Patent Pick Co., Sheffield, are in the field with a formidable looking pulverising machine, which they have suggestively christened "The Devil."

## CUSTOMS AND INLAND REVENUE ACT, 1888.

THE Board of Inland Revenue directs attention to the provisions of this Act, which has now received the Royal Assent:—

In lieu of the stamp duty of one penny paid on a Contract Note, as now defined by the Customs and Inland Revenue Act, 1878, where such Note advises the sale or purchase of any stock or marketable security of the value of one hundred pounds or upwards, there is to be charged the duty of Sixpence.

The new duty is to be denoted by an adhesive stamp, or adhesive stamps, appropriated to a Contract Note, and such stamp or stamps is, or are, to be cancelled by the person by whom the Note is executed.

It is to be observed that section 69 of the Stamp Act, 1870, imposes a penalty of twenty pounds on every person who makes or executes any Contract Note chargeable with stamp duty, and not duly stamped, and it is further provided that no broker, agent, or other person shall have any legal claim to any charge for brokerage, commission, or agency, with reference to the sale or purchase of any stock or marketable security of the value of five pounds or upwards mentioned or referred to in any Contract Note, unless such Note is duly stamped.

There is to be charged upon a transfer, assignment, disposition, or assignation, otherwise than on mortgage, of any mortgage, bond, debenture, or covenant (being a marketable security), or of any security for money by or on behalf of any Foreign or Colonial State, Government, municipal body, corporation, or company (being a marketable security), the following duties; (that is to say):

Where the transfer, assignment, disposition, or assignation is on sale, the same *ad valorem* duties as are now charged under the Stamp Act, 1870, upon a conveyance or transfer on sale of any property, such duties being at the rate of ten shillings per cent. of the amount or value of the consideration for the sale.

Where the transfer, assignment, disposition, or assignation is of any other kind than on sale or mortgage, ten shillings.

The above duties are in substitution for the duty of sixpence for every one hundred pounds, and also for any fractional part of one hundred pounds, of the amount transferred, assigned, or disponed in any case in which such duty is imposed by the Stamp Act, 1870, and they must be denoted by impressed stamps.

It is also enacted that in relation to instruments executed after the passing of this Act which are chargeable with *ad valorem* stamp duty under the undermentioned heads, viz.:—

(*a*) Bond, covenant or instrument of any kind whatsoever;
(*b*) Conveyance or transfer on sale;
(*c*) Lease or tack (including an agreement for a lease or tack for any term not exceeding thirty-five years);
(*d*) Mortgage, bond, debenture, covenant and warrant of attorney to confess and enter up judgment;
(*e*) Equitable mortgage;
(*f*) Settlement;

the following provisions are to have effect:—

(*a*) The instrument, unless it is written upon duly stamped material, is to be duly stamped with the proper *ad valorem* duty before the expiration of thirty days after it is first executed, or after it has been first received in the United Kingdom in case it is first executed at any place out of the United Kingdom, unless the opinion of the Commissioners of Inland Revenue, with respect to the amount of duty with which the instrument is chargeable, has, before such expiration, been required under the provisions of section 18 of the Stamp Act, 1870.

(*b*) In case the opinion of the said Commissioners with respect to any such instrument has been required, the instrument is to be stamped in accordance with the

assessment of the Commissioners within fourteen days after the date of notice of such assessment.

(6) If any such instrument is not duly stamped in conformity with the foregoing provisions, the person in that behalf specified in the First Schedule to the Act is to forfeit the sum of Ten Pounds, and in addition to the penalty payable by law on stamping the instrument there is to be paid an additional penalty equivalent to the stamp duty thereon, unless a reasonable excuse for the delay in stamping, or for the omission to stamp, or the insufficiency of stamp, be afforded to the satisfaction of the said Commissioners, or of the court, judge, arbitrator, or referee before whom it is produced.

The person specified in the First Schedule to the Act as liable to the personal penalty of ten pounds above referred to is, briefly stated, the person in whose favour the instrument operates, or, in the case of a settlement, the settlor.

The personal penalty is to be sued for by information in the High Court, in England in the name of the Attorney-General for England, in Scotland in the name of the Lord Advocate, and in Ireland in the name of the Attorney-General for Ireland, and may be recovered with full costs of suit.

The Board are empowered to reward any person who may inform them of any case in which the personal penalty has been incurred, or who may assist in the recovery of such penalty.

In addition to the imposition of the personal penalty above referred to, the following changes take effect as regards the penalties payable on stamping instruments after the execution thereof :—

(1.) The period within which the Board consent to stamp without penalty instruments executed in the United Kingdom, not subject to any special enactments or regulations, is reduced from two months to thirty days after the first execution.

(2.) The period within which an instrument first executed out of the United Kingdom may be stamped without penalty is reduced from two months to thirty days after its first receipt in the United Kingdom.

(3.) The period within which the Board are empowered, if they think fit, to remit or mitigate the penalty or penalties, is reduced from twelve months to three months after first execution.

(4.) In the case of the instruments chargeable with *ad valorem* duties under the heads set forth above, and executed after the passing of the Act, the penalty of ten pounds, with interest in certain cases, on payment of which the instrument may be stamped after execution, is increased by a sum equivalent to the unpaid duty.

The Act also provides that every condition of sale framed with the view of precluding objection or requisition upon the ground of absence or insufficiency of stamp upon any instrument, executed after the passing of the Act, and every contract, arrangement, or undertaking for assuming the liability on account of absence or insufficiency of stamp upon any such instrument or indemnifying against such liability, absence, or insufficiency, is to be void.

## SOCIETY OF CHEMICAL INDUSTRY.

MANCHESTER SECTION.

A SPECIAL meeting of this section was held at the Victoria Hotel, on Tuesday evening, May 15th, for the purpose of electing five members of committee. An election of five members had been made at the April meeting of the section, but on representations made by dissentient members to the London Council, the election was declared invalid, and a further one ordered to be made. At the meeting now held Dr. Schunk was in the chair, and some fifty members were present. At the outset of the proceedings, Mr. George E. Davis entered a formal protest against any election being made at all by the members, contending that by the general rules of the Society and the bye-laws of the Section no election could now be made by the members, but that it was the function of the committee, under the "unforeseen circumstances" of the case to elect five members to replace the retiring ones. A resolution, however, was carried to follow the instructions of the London Council in the matter and proceed to an election by ballot. The scrutineers having handed in their report, the following were declared duly elected, and the meeting then terminated :—Sir H. E. Roscoe, and Messrs. P. Hart, R. F. Carpenter, J. C. Bell, C. Truby. Subsequently an informal meeting was held for the purpose of giving the hon. sec. of the section, Mr. J. Carter Bell, an opportunity of replying to an attack which one of the members had made on him by circular with reference to the discharge of his official duties as secretary. As the result, a resolution was put to the meeting, and having been cordially supported by some half-dozen of the leading members of the section, was carried *nem dis* expressing confidence in the hon. sec., and thanking him for his past exertions on behalf of the section.

## HYDROGEN PEROXIDE FOR BLEACHING IVORY AND BONE.

IVORY and bone are both strongly affected by acid, as well as by alkaline fluids, consequently for the purpose of bleaching them we must on this account only use bleach baths of a neutral reaction. Ivory requires no preparation for the bleach bath; on the other hand, bones must be freed from fat and any fleshy or other particles, whether it be by treatment with soda solution or benzine.

**The Bleach Bath** is prepared from a solution of hydrogen peroxide, by the careful addition of ammonia in such a manner that when red or blue litmus paper is plunged into it the same remains unchanged, a very small acid quality being less injurious than alkali. Into this neutral bleach bath the bones or the ivory are plunged, and allowed to remain for twenty-four hours therein at a temperature of 30° to 34° Celsius.

After the same have passed through a second equal bleach bath for twelve hours, at the lower temperature of 20° Celsius, they must be slowly dried in the air, and when practicable in sunlight. The advantageous action of sunlight, for these substances especially, cannot be too highly recommended.—*Königswarter and Ebell.*

## BLEACHING OSTRICH FEATHERS WITH HYDROGEN PEROXIDE.

**I. Sorting the Feathers.**—The raw ostrich feathers are not all equally suited for the process of bleaching. Of the material generally met with, only one portion can be used for the production of half-white, the other portion alone for that of pure white feathers.

**II. Preparation of the Feathers.**—The carefully sorted and selected feathers must first of all have all grease and dirt removed from them. For this purpose they must be treated with soap and water, and afterwards with the assistance of a soft brush. These operations must be continued until they become *easily* moistened with the water, when they must then be left for some time in clean water. In order to remove all fluids from the feathers they should pass through a centrifugal machine.

**III. The Bleach Bath.**—Twenty litres of hydrogen peroxide are placed in a longish wooden tub with 450 grammes of ammonia 20° B. = 0·93° sp. gr., mix together, and then heated by means of a closed leaden coil up to 34° Celsius. Into this fluid place 5 kilos. of the cleaned feathers, stirring the same with the hands every hour. The bleaching is completed in twenty-four hours. If an absolute white is desired, a second bath is then recommended, allowing the feathers to remain in the same for a shorter time.

**IV. After Treatment.**—When the bleaching is completed, the feathers should be carefully removed and placed in a cold water bath, composed of 100 grammes of sulphuric acid 66° B. to each 100 litres of water. In this bath they are allowed to remain for one and a half hours, when they must be plunged into clean, soft water, and thoroughly rinsed out. The damp feathers should then be drawn through a starch milk (not paste), somewhat tinged with aniline blue, and then finally exposed to the slow drying process, either in the open air or in a drying room, taking care to shake them occasionally in order to avoid any adhesion of the small fibres. After removing the starch by shaking, the feathers can then undergo the usual manipulation of curling and burning.—*Königswarter and Ebell.*

EXPLOSION AT AN ALKALI WORKS.—A serious explosion has taken place at the works of the Lancashire Sulphur and Alkali Co. Limited, Widnes. No one appears to have been injured, but some damage to plant and property was done.

THE OLDBURY ALUMINIUM WORKS.—We have it on good authority that the sodium plant at the above works has been now running some weeks, and that the chloride of aluminium side will start next week.

# Parliamentary Jottings.

THE COMMITTEE ON EXPLOSIVES.

In answer to Captain Colomb, Mr. E. Stanhope said—The members of the committee on explosives are Sir Frederick Abel, F.R.S., chemist to the War Department; Professor Dewar, F.R.S., professor of chemistry at the University of Cambridge and at the Royal Institution; and Dr. Dupré, F.R.S., consulting chemist to the Home Office on explosives. They are during the present week making experiments with shell charged with high explosives.

ROYAL NORMAL SCHOOL, SOUTH KENSINGTON.

Sir H. Roscoe asked the First Lord of the Treasury whether any steps had been taken, and, if so, what steps, for the purpose of providing accommodation for the physical laboratory in the Royal Normal School at South Kensington, in consequence of the appropriation of the site of the present temporary building by the authorities of the Imperial Institute.—Mr. W. H. Smith: The Office of Works is in communication with the Science and Art Department, and is about to report to the Treasury as to what arrangements can be made for providing accommodation for the physical laboratory.

LIMITED LIABILITY COMPANIES.

In answer to Mr. Watt, Mr. W. H. Smith said—The hon. member is aware that the Government intend introducing a bill dealing with the subject of limited liability, and as to the date of the introduction of such bill I am unable to add anything to the answer I gave on the 1st instant.

THE SUGAR BOUNTIES.

Mr. J. C. Bolton asked the First Lord of the Treasury whether it was true, as stated in the public press, that the International Conference on Sugar Bounties had concluded a convention for the abolition of bounties, and that all the Powers had engaged to prohibit absolutely the importation of bounty-fed sugar.—Mr. W. H. Smith: In answer to the hon. member, I have to say that at the concluding sitting of the International Conference on Sugar Bounties the final protocol, with the draft convention, was signed by the representatives of all the Powers. Those representatives will now submit the draft convention, with the reserves they have made, to their respective Governments, who will communicate their views to Her Majesty's Government by July 5. The plenipotentiaries will be invited to meet in London on August 16 at latest for the signature of the treaty. Pending the receipt of such communications and the reassembling of the plenipotentiaries, it would be obviously improper and contrary to diplomatic usage to give to the House the details of a draft treaty which in its present form is the property of the Powers collectively, and not of any individual Power. I may add that this view has been adopted by the delegates of all the Powers, who agreed at their last meeting that no publicity should be given to the draft convention until after the reassembling of the plenipotentiaries.—Mr. J. C. Bolton asked whether the statement, as reported, that all the Powers had engaged to prohibit absolutely the importation of bounty-fed sugar was true or false.—Mr. W. H. Smith: The accurate statement is that which I have just read out to the House.—In answer to Mr. Conybeare, Mr. W. H. Smith added that, with regard to giving an opportunity for the discussion of the convention, the usual course would be followed.—Mr. J. G. Bolton asked the First Lord of the Treasury to give a pledge on behalf of the Government that an opportunity would be given to the House of expressing its opinion on the question before the country was finally committed to absolute prohibition.—Sir W. Lawson asked whether the Government had taken into account the increased amount the people of this country would have to pay for their sugar if its importation were prohibited.—Mr. Picton wished to know whether the Government had power to prohibit the importation of any kind of sugar without an Act of Parliament.—Mr. W. H. Smith: The hon. gentleman who asked me the last question has answered the hon. member for Stirlingshire. It is absolutely impossible to carry out any engagement without the authority of Parliament.—Sir W. Harcourt asked whether the 16th of August was the date at which the final ratification of this treaty was to take place.—Mr. W. H. Smith: That, I believe, is the present arrangement of the Powers, but any agreement springing out of the convention will be a prospective arrangement.—Mr. Illingworth asked whether it was not desirable that legislation in regard to this subject should be as early as possible in order that if there was a disinclination on the part of Parliament to proceed other Governments would be saved further trouble in the matter.—Mr. W. H. Smith: It is absolutely impossible for us to propose legislation in the meantime, seeing that the convention may fall to the ground, or that the Powers, or any of them, may disagree with it.

THE USE OF SACCHARINE IN BEER.

The House having resumed the Committee on the Customs and Inland Revenue Bill,

Sir L. Playfair moved to amend clause 5, which gave power to the Revenue Department to prohibit any substance used in the manufacture of exciseable articles which might be in restraint of revenue. There could be no objection to the prohibition of substances which were noxious or detrimental, but the clause gave an absolute power of prohibition with respect to substances which were not so, and it had a special bearing on the brewing trade. A new substance had been discovered called saccharine, which was one of the derivations of coal-tar, and had three hundred times the sweetness of sugar. It could not be converted into alcohol, but, in addition to its strong sweetening quality, it had a valuable antiseptic property which would preserve light beers in hot weather. It would, therefore, be most useful to brewers in this country, and, as it could be applied in preserving fruits and in other ways, its production was a great and growing industry. The raw materials were obtained in this country, but it had to be sent to Germany for manufacture, and was there made for 50s. a pound, whereas it might be manufactured here for 20s. or 30s. A company was started for that purpose with £200,000, but when it was known that the Revenue were going to have a prohibitory power against its use the subscribers withdrew, and the industry could not be carried on in this country. One reason why the Revenue were afraid of saccharine was that it had a strange effect upon the palate, and made light beers taste like strong beers—(laughter)—and porter like stout.—(Renewed laughter.) It was supposed, therefore, that the people would use more of the lighter beer, thinking they were taking strong beer, while the Revenue would be in danger because strong beer paid a higher revenue. He did not at all object to the Excise regulating the use of saccharine, but he objected strongly to its total prohibition, and hoped the Chancellor of the Exchequer would allow this new industry to have a trial in England. Large works were being erected in Belgium to make it for the brewery trade, and it was used in Germany for brewing purposes, and if it were prohibited here our brewers would be placed at a great disadvantage as against foreign brewers. He was anxious that the Chancellor of the Exchequer should watch its use, and then, if necessary, obtain power to tax the saccharine used as "priming" if it was in restraint of revenue; for to that the brewers would have no objection. If the right hon. gentleman did not do so, this substance might still be employed in some way, for it was very difficult to detect, a very small quantity per barrel was sufficient, and another substance could be added which would absolutely prevent its detection. He proposed, therefore, to insert words providing for the regulation, not the prohibition, of the use of saccharine.—(Hear, hear.)

The Chancellor of the Exchequer said he had not heard of any great anxiety on the part of brewers to use this substance; but it was calculated that its employment would cause a loss to the revenue of not less than one million sterling. Therefore it was his duty to look very closely into the matter. As saccharine would not make beer more or less strong the question of the alcoholic spirit did not arise at all; but it would produce upon the palate an impression that the beer was something different from what it was in reality, and that the consumer was taking strong beer instead of light beer.—("Hear, hear," and laughter.) That might be very good from the temperance point of view—(hear, hear)—; but as this substance did not give sustenance like the sugar for which it would be substituted, it would be a kind of fraud upon the beer drinker.—(Hear, hear.) The main part of the case was that the beer duty was determined by the specific gravity of the beer, and as this substance added nothing to the specific gravity it could not be taken into account as sugar was taken into account, and the amount paid on the sugar would be lost. As to the suggestion of a growing industry, that would be confined to the company which held the patent which had been obtained, and he understood that so remarkable was the sweetening power of this new substance that twelve tons would suffice for deceiving the palate of every beer drinker in the country. It had been suggested that a register should be kept of the quantities of saccharine supplied to brewers, but he did not

think that would be practicable. Under these circumstances the Inland Revenue did not see their way to allow the use of this substance in the brewing industry.—(Hear, hear.) The right hon. gentleman added that as a compromise he was willing to accept a provision to the effect that the prohibition of the use of saccharine might be withdrawn by notice being given in the *Gazette*.

Sir Henry Roscoe objected to the way in which the clause was drawn. It seemed to him that two different things were mixed up, for in the first place mention was made of noxious and detrimental substances which certainly ought to be prohibited, and then substances calculated to act in restraint of revenue, which, however, might be harmless. Both were prohibited by the bill. He congratulated the Chancellor of the Exchequer on his chemical knowledge—(laughter);—but he thought the right hon. gentleman had referred to this substance in rather an offensive way.—(Hear, hear.) This was one of the most interesting, and was likely to be one of the most important of modern discoveries, and he did not think that to speak of tar in beer was the right way to treat the matter. It would rather seem as though the Chancellor of the Exchequer wished to encourage the drinking of strong beers. In the interest of the health and the welfare of the population they ought to prefer light beers, and the introduction of this material in the minute quantities proposed would have a tendency in that direction. The position taken up by the authorities of Somerset House was rather a doubtful one. Its detection in the small quantities proposed to be used was almost impossible, and if it were absolutely prohibited he had little doubt it would be used "under the rose." It would be much better, in his opinion, to place the use of the article under proper restrictions. In this clause no right of appeal against the decision of the Somerset House authorities was provided. Even under the Food and Drugs Act there was a right of appeal to the Court of Queen's Bench, and he did not think the authorities at Somerset House should be the sole judges on matters of this kind.—(Hear, hear.) The manufacture of these coal-tar articles was largely carried on in Germany, and he did not wish to do anything that would restrain the opening of an interesting and perhaps very important industry. He agreed that they ought to prohibit what was noxious; but means might be devised for regulating the use of this material on equitable terms. He supported the amendment.

Mr. Gladstone said that if the interest of the revenue was so seriously involved as to make it the duty of the Chancellor of the Exchequer to take a prohibitive power against the British brewer it was also necessary that the principle of "simultaneity" should be introduced—(laughter)—, and that the right hon. gentleman should at the same time take similar legislative power for the purpose of checking its introduction from abroad, because it would be extremely hard on the producer of beer at home if he were precluded from doing that which there was no legislative power to prevent his foreign competitor from doing.—(Hear, hear.) He also asked the right hon. gentleman for an assurance that before he asked the House finally to sanction prohibition of a substance undoubtedly harmless, he would do his best to ascertain that nothing but prohibition was available.

# Trade Notes.

The Sugar Maple.—In Quebec the making of sugar from the sap of the maple tree is a large industry. This year the sugar season has been unusually favourable; accounts say that it has been the best for many years. In some orchards the make exceeds 3lb. per tree all round.

More Gold in Wales.—Gold has been struck on the Friog Farm, on the property of Mr. C. Owen. Operations cannot, however, be commenced, as the existing Crown injunction prevents it. As we have often said, England has no enemies except Englishmen.

Abolition of Slavery in Great Britain.—Now that the Brazilian Chamber of Deputies has voted the immediate and unconditional abolition of slavery in Brazil, perhaps an example has been set the British Government to free its slaves who are now groaning under the lash of the "sweater."

New Chemical Apparatus.—Messrs. Mawson and Swan have sent us a supplementary catalogue of new apparatus—Stead's Analytical Gas Apparatus, Stark's Apparatus for rapidly estimating unabsorbed chlorine in bleaching powder chambers, Ridsdale's Chromometer, Bunge's Balances, and other technical appliances.

Salt at Coventry.—In boring for water at Spon End, saline matter has been detected at two hundred yards from the surface. Query—Will Coventry become a second Bromsgrove or Northwich?

Immigrants in Canada.—It has been pointed that only farmers, farm labourers, and domestic servants are required in any number, the demand for mechanics, general labourers, and navvies not being very great.

Poisoning Wells.—What righteous indignation there was in the House of Commons when it was reported that some Mexican Indians had been poisoned with strychnine! How quiet the House is now when it is reported that two wells in Ireland have been poisoned to injure emergency bailiffs!

The Linlithgow Oil Company Limited.—The report by the directors of this company states that the profit for the year ending March 31st was £4,244. 17s. 9d. From this falls to be deducted £2,902. 8s. 5d. for interest, leaving a balance of £1,342. 9s. 4d. This amount the directors propose to deduct from the sum of £3,904. 18s. 11d., being balance brought forward from last year. The directors are of opinion that, considering the extremely depressed condition of the oil industry during the past year, the result is not unsatisfactory. The works are capable of turning out refined products of the best quality, and at a moderate cost; and with the present improved prices, the shareholders should obtain a good return for the money they have invested in the undertaking. In June last a strike took place, involving a stoppage of the works for over three months, and while it no doubt assisted in raising prices to the present level, the loss sustained from the stoppage was of a serious character, and has materially reduced the balance at the credit of profit and loss account. Should prices be maintained during the current year, the directors are hopeful that they will be in a position to recommend a satisfactory dividend. A new mine and an "opencast" working have been opened in the Dunnet seam of shale. The cost has been borne by revenue. The works have also been efficiently maintained out of revenue, and the directors are satisfied that they are fully equipped for dealing in the most economical manner with a large throughput of crude oil. In consequence of the strike the output of shale during the year was less than during 1886-87, but owing to improvements the yield of sulphate of ammonia was considerably greater. Last year candlemaking was added to the company's operations. In consequence of keen competition and the low prices at which contracts were made, it was not deemed expedient to push this branch of the business. The agreement which has since been entered into between nearly all the candlemakers throughout the kingdom, which permits of a fair margin of profit between the price of scale or wax and candles, justifies the directors in extending this department. They have accordingly made arrangements which they believe will be profitable to the shareholders. Little further expenditure on plant will be necessary. At the annual meeting of shareholders on 3rd June, 1887, a motion to the effect that an effort should be made to arrange with the directors of the other Scotch mineral oil companies to minimise the competition which then existed was unanimously agreed on. The directors thoroughly approved of the policy suggested, and have co-operated with the directors of the other companies in carrying it out. Many conferences have taken place, and the results may be summarised as follows:—An agreement fixing minimum prices for burning oil; an agreement between American and Scotch producers of hard scale and semi-refined wax as to minimum prices, with power, if necessary, to curtail exports from America and production in Scotland; an agreement between candlemakers fixing minimum prices for candles, discounts, and other matters. The expenditure on capital account has been moderate. During the year the total amount was £3,772. 6s. 8d., composed of the following items:—Mining department, £465. 16s. 4d.; refinery, £2,023. 7s. 6d.; candlework, £1,124. 9s.; general plant, £158. 13s. 10d.; total, £3,772. 6s. 8d. The retiring directors at this time are Mr. Paterson and Mr. Landale. They are eligible for re-election. Messrs. Lindsay, Jamieson, and Haldane, C.A., the auditors for the company, also retire, and are eligible for re-election. A note appended to the statement of accounts says that the balance of profit is arrived at without any allowance having been made for depreciation during the past two years.

New Coinage.—Twenty-mark pieces bearing the effigies of Emperor Friedrich have been coined to the value of two and a half million marks and handed over from the mint to the Reichsbank. On an average forty of these coins were minted per minute.

THE RIO TINTO COMPANY.—The annual meeting of this company was held in London on the 16th inst., Mr. H. M. Matheson presiding. In moving the adoption of the report, the chairman said that as regarded the business of the current year he was glad to say that everything pointed to a very favourable result for the shareholders. The sales of pyrites in England, Germany, and the United States were at least as large as those of last year. Sulphur was sold at the same price, and the copper contents of the ore being sold on the same basis as formerly must give the company a very handsome increase. The manufacture of copper was being continued on a large scale. The directors had informed the shareholders in the report of their having entered into a contract with their largest customers for the entire copper production of the company at the mines in 1888, 1889, and 1890 in excess of what was required to satisfy already existing contracts. The provisional contract was signed, and had been acted upon since January 1, with results that were very satisfactory. He was glad now to announce that the definitive contract had been executed. All proper mercantile precautions were stipulated for by them (the directors), and given them to ensure the due fulfilment of this important engagement. When this contract was entered into the position of the company in regard to revenue could be easily judged by the shareholders when he said that the average price the directors obtained for their copper in 1887 was about £48 per ton, and that they would balance an addition of at least £20 per ton on the 26,000 tons which they expected to turn out during the three years the contract lasted. Mr. Baker asked whether, in view of the six months' improved price of copper, ranging from £40 to £80 a ton, the directors would declare an interim dividend between May and December. Mr. Henderson inquired the cost of turning the waste heaps into metallic copper. Another shareholder asked to know the basis of the agreement with the Société de Métaux. The chairman said that in the interests of the company he could not state that, but the shareholders might rest assured the directors would look after their interests. He went on to say that at the present rate of output the copper in the mine will last about 150 to 200 years. The articles of association would not permit of quarterly dividends. As to the waste heaps, they were not exactly "waste." They consisted partly of ore from which a portion of the metal had been removed and partly of fresh ore. They contained 80,000 tons of metal, and the cost of putting that upon the market was £20 per ton. In answer to a further question by Mr. Davis, the chairman said they had not hypothecated the rights of any of the mortgage-owners in the arrangements with regard to the loan. The report was then approved. Mr. J. M. Macdonald and Mr. H. M. Matheson were reappointed directors.

MR. EDISON'S PHONOGRAPH.—An exhibition of Mr. Edison's new phonograph, especially in the reproduction of singing and the sounds of musical instruments, was given on Friday afternoon in last week, at the inventor's laboratory. Experiments were made with the piano, violin, cornet, and clarionet, separately and together. The version of some chords of a polka was clear, distinct, and musical. With the funnel for magnifying the sound placed on the machine the music sounded as the music of a piano coming through a thick partition. Every note could be heard, but much of the musical effect was lost. The phonograph's reproduction of music was invariably a trifle sharper in pitch than the original. Of the different instruments tried the cornet gave back the loudest and clearest tones, easily distinguished 20 or 30 feet from the diaphragm. Within the past month Mr. Edison has made several improvements in the phonograph to which he attaches great importance.

DIME CON QUIEN ANDAS, Y TE DIRÉ QUIEN ERES.—Two small boys, walking in the neighbourhood of Tottenham-court-road, passed a tobacconist's shop, when the smaller boy remarked to the larger one: Say, Bill! I've got a ha'penny, and if you've got one too we'll have a penny smoke between us." "Certainly," replied Bill, and immediately produced his copper. Thereupon Tommy disappeared into the tobacconist's shop, from which he issued a moment later with a penny "Pickwick," all aglow, in his mouth. The boys walked side by side for a few minutes, when the larger boy exclaimed, "Say, Tom, ain't I going to have a puff? The weed is half mine." "Oh! you shut up," was the reply, "I'm chairman of this company; you are only a shareholder. You can spit!"

"POISONOUS TIN PLATES."—The following letter appears in the *South Wales Daily News*:—There appeared in your [illegible] a few remarks by Mr. Henry James Jones on the above subject, which are to the following [illegible] lead salt shall have been found in American canned [illegible] the Americans are alone responsible for it, and it arises not from the acid formed by the decomposition of unsound provisions acting upon the lead in the solder, but by the common use in the States of a flux which is used to make the solder run along the seams of the can, and that the flux is composed of muriatic acid or spirits of salts alone, and in some cases they use a solution of chloride of zinc, either of which are highly poisonous chemicals." If it would not be trespassing too much on your valuable paper, I beg to ask Mr. Jones the following questions:—(1) Do manufacturers of tin plates use flux in the manufacturing department, in order that the tin should run along the surface of the plate and to produce better yields? (2) Do they use other chemicals in the tinning department, especially where patents are used? (3) Would it be possible to finish plates in those patents without the use of any chemical process?

PATENT VARNISHED METAL PLATES.—The firm Gustav Bähr in Leipzig has patented a new kind of varnished metal plates for advertising purposes. The varnish colours fixed on the tin or iron plates combine so intimately with the metal that they do not peal or break off when the metal is bent. The prices of the plates are not much more expensive than those of ordinary papier-maché.—*Kuhlow.*

IMPORT OF GERMAN COAL TO BELGIUM.—While the import of English, French, and Dutch coal to Belgium has constantly declined that of German coal is ever on the increase. During the first quarter of the current year, 93,783 tons were imported from Germany against 78,382 tons in the corresponding period of the previous year. On the other hand, the import from England declined from 73,654 tons to 59,722 tons, that from France from 53,442 tons to 38,813 tons, that from Holland from 63,539 tons to 61,008 tons. During the current business year the re-conquest of the Belgian market by German coal is still making progress. It must be added, however, that the import of German coke has somewhat declined, having amounted during the first quarter of the current year to 3,220 tons against 3,421 tons in the corresponding period of 1887.—*Kuhlow.*

SPIRIT MOTORS.—Messrs. Yarrow have exhibited a number of launches propelled by means of vaporised spirit instead of steam. They are small, but the principle, which has so far worked satisfactorily, may be applied to larger vessels. The question of that application will largely depend on the commercial results, the cost being one of the main considerations. There is little doubt that coal will have more competitors in the future than in the past; and one of the chief of these will be oil in its many forms—crude, refined, or vaporised.

STRIKE AT A GLASS WORKS.—From Paris we are apprised that, in consequence of the strike of the men employed in the glass manufactory of Pantin, all the glass manufacturers of the departments Seine and Seine-et-Oise formed a syndicate, and decided to blow out their furnaces on Saturday unless the strikers at Pantin resumed work. The manufactories affected altogether employ 3,000 workmen. The masters communicated their intention to the prefect of police, who recommended them to make concessions to the men.

CEYLON BARK SHIPMENTS.—Total shipments from Ceylon, October 1, Branch and Trunk:—

| | | | |
|---|---|---|---|
| 1887, to April 12, | 1888 | ..... | 5,803,395 lb. |
| 1886, ,, | 1887 | ..... | 8,031,374 lb. |
| 1885, ,, | 1886 | ..... | 7,929,888 lb. |
| 1884, ,, | 1885 | ..... | 4,971,623 lb. |

THE ANILINE DYE INDUSTRY IN BERLIN.—The gross profit of the Aktien-Gesellschaft für Anilin-Fabrikation in Berlin amounted last year to 1,901,556 mks., against 1,529,711 mks. in the previous year, and the net profit to 506,989 mks. against 257,916 mks. in 1886. A dividend of 10 per cent. will be paid against one of 7½ per cent. in the previous year. The factories belonging to the company, inclusive of the branch establishments at Frankfort-on-Maine, Moscow, and Pantin have been in regular operation. Prices for the chief raw stuffs were not subject to very violent fluctuations last year, and, in consequence, the quotations for the manufactured products have also remained stationary. German export in aniline dyes increased, having amounted to 6,542,000 kg. against 5,700,000 kg. in 1886.—*Kuhlow.*

THE EXPLOSIVES INDUSTRY AT COLOGNE.—The Rheinisch-Westphälische Sprengstoff-Aktiengesellschaft attained in 1887 a gross profit of 169,042 mks., and a net profit of 106,569 mks. The general meeting decided upon declaring a dividend of 10 per cent. The prospects of the current year are described as satisfactory.—*Kuhlow.*

dynamite were exploded inside two thick lead cylinders, with the result that the internal expansion in the case of the carbo-dynamite was equal to 590 cubic centimètres, and in that of the ordinary dynamite to 347 cubic centimètres. The original space was equal to 78 cubic centimètres in each case, and the charges used weighed each ½ oz. Similar charges of the two explosives were then placed inside two thick steel tubes, each 1 foot long. The ordinary dynamite burst its tube well, but the carbo-dynamite did its work much better, bending the tube as well as bursting it, and sending it flying some 15 yards from the point of explosion. The final test was the exploding of 1 oz. each of the two explosives on separate steel discs, 3 in. in diameter and $\frac{5}{16}$ in. thick, and supported separately on steel rings. The ordinary dynamite caused its disc to cup to the extent of a quarter of an inch, while the carbo-dynamite cupped its disc $\frac{1}{16}$ in. and drove its collar into the ground. Samples of the two explosives were shown in water, which were stated to have been immersed on March 4. The ordinary dynamite had become perfectly dissolved, the nitro-glycerine lying at the bottom of the water, while the carbo-dynamite remained intact. The trials were of a thoroughly practical character, and from first to last satisfactorily demonstrated the superior advantages of the new explosive.

# Correspondence.

*ANSWERS TO CORRESPONDENTS.*

B. B. C.—It is not true. It is only a *canard* that is being circulated to influence the market.

A. J. D.—The stamp duty has to be paid on registration.

H. H.—In twelve years the production has increased fourfold, and now the demand is not equal to the supply.

H. S.—Your query is answered by matter in the present number.

Member.—We have been informed on good authority that the paragraph was not directed against ourselves. No doubt it was an error, but not premeditated; it happened quite by chance.

Aluminium.—The trade may expand, and new uses for the metal open up, if it can be produced cheaply enough; but for its capability of resisting corrosion, we think it has been too highly estimated.

Salt.—Mainly for bleaching.

Dr. Hurter.—Next week.

W. M.—Owing to Whitsuntide we were at press when your letter arrived. In our next.

## THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

A CONVERSAZIONE of this society was held at the society's house, Bloomsbury-square, on Tuesday the 15th inst., to celebrate the opening of the new examination hall and research laboratories. The guests, in number more than four hundred, were received in the old building by the president, vice-president, and the members of the council, and were subsequently entertained with an instrumental concert, given by the Messrs. Hann, in the new examination hall. For some time past it had been felt that the accommodation afforded by the old building was insufficient for the society's examinations, and the new rooms were undertaken to supply the deficiency. The new building occupies a site behind the two houses adjacent to the old building, and has a frontage in Pied Bull-yard. It comprises, on the ground floor, besides the entrance hall, a large examination hall, a dispensing room, and chemical examiner's laboratory; and two rooms each on the *entresol*, first and second floors. The rooms on the first floor are used as research laboratories; and those on the other floors are variously allotted. The basement contains large preparation and store rooms, as well as a boiler room, lavatories, etc. The large examination hall is about 27ft. by 48ft., with a height of 21ft. It is lighted by ceiling lights in the centre and at the west end, and by four large windows at the east end. A dado of slightly darkened oak runs round the hall, and the walls and ceiling, which are finished in Parian cement, are handsomely decorated. The research rooms on the first floor are about 27ft. by 17ft. each, are exceptionally well lighted, and have been fitted up with great care for their special requirements. The walls of the entrance hall and staircase are in Parian cement with a dado of white tiles, and the building has been carried out with fireproof floors throughout. The sanitary arrangements have received special attention, and the whole of the rooms have been fitted with inlet and outlet ventilators, As to the exterior appearance, the south and east fronts of the new buildings are constructed of stock bricks with red Fareham dressings, the sills and copings being of red Mansfield stone; the other elevations are in stock bricks.

## AIR ENGINES FOR TRAMWAYS.

FIVE or six of the British Mékarski Improved Air Engines Company tramway cars are now running along the Caledonian-road, from King's Cross to Holloway. The car is four-wheeled, one pair of wheels alone being used for driving. To the driving wheels a pair of high and low pressure ordinary working cylinders, each of 8in. stroke, are connected. The high-pressure cylinder is 5½in. diameter, and the low-pressure is 8in. diameter, the compressed air from the reservoirs being used through them successively. Means are provided by which the high-pressure air can be used in the low-pressure cylinder, if necessary, to facilitate starting. The principal feature of the system, however, is that the air in passing from the reservoirs to the cylinders bubbles through boiling water and steam of 60lb. pressure on the square inch, contained in a vessel called the "hot-pot," this vessel being charged at the pumping station during the time occupied in charging the car with compressed air. The advantages claimed in thus using the air are that the heat which the air takes up in passing through the hot water not only causes the air to expand, but prevents the formation of snow in the cylinders and at the exhaust. The moisture also picked up by the air in its passage through the water acts as a lubricant for the slide valves and pistons. The working pressure in the high-pressure cylinder can be varied at will; it is usually from 120lb. down to 50lb. on the square inch, the variation being regulated by a valve of peculiar construction. One of the "hot-pots," with its regulating valve upon it, has been placed at each end of the car, and means for ingress and egress of passengers have (as already said) been provided; so that when the end of the journey is reached, the driver takes his reversing handle and the wheel of the regulating valve to the opposite end of the car with him, and the conductor changes ends as in the ordinary horse car. The car, which presents very much the appearance of an ordinary horse car, but without the horses, and with its platform or floor placed at a somewhat greater distance from the ground, makes no noise with the exhaust of the engines; there is no steam visible, neither is there any smell of fire, or of hot oil or other lubricant for the engines. The first cost of each car is stated to be about equal to one of the ordinary horse cars and its equipment of horses (ten). Among the many requirements of the Board of Trade is one which says that there shall be provided upon the car a governor, which shall, when the car exceeds a speed of ten miles an hour, not only cut off the steam (in this case it is air) from the engines working the car, but shall put on its brakes. An apparatus fulfilling these requirements has been devised and fitted, and it works most satisfactorily. As an extra precaution for safety, the brakes can be applied to all four wheels in either one of three different and distinct ways. With the most powerful of these arrangements, and when running at its greatest speed and in ordinary weather, the car is brought to rest in a distance slightly exceeding its own length.

## TOBACCO CULTIVATION IN ENGLAND.

THE judges appointed to determine the award for the prize of £50 offered by the London Chamber of Commerce for the best specimens of British grown tobacco met this week in the Fenchurch-street Warehouse of the East and West India Dock Company. Eleven entries were submitted, but only four of them fulfilled the conditions of the competition so far as weight was concerned, the minimum quantity being fixed at 400lb. In the result these were placed in the following order of merit:—(1) Messrs. James Carter and Co., High Holborn, W.C. (to whom the judges recommended that the prize should be awarded); (2) Mr. W. L. Wigan, Larkfield House, Maidstone; (3) Sir Edward Birkbeck, Bart., M.P., Norwich; (4) Mr. John Graves, Church Villa, Skirbeck, Boston, Lincolnshire. Amongst the samples not intended for competition, was a very fine lot of Irish growth, sent by Mr. John Cairns, 12, Windsor Avenue, Fair View, Dublin, which was much admired. None of the samples of tobacco submitted was really in a merchantable condition, so that it would appear that English growers have

a great deal to learn, especially as regards curing. One of the objects of the competition was to enable the judges to make "a report on the yet doubtful question as to the possibility of growing tobacco in Great Britain such as in quality, relatively to price, can compete with all other countries."

# Market Reports.

## THE LIVERPOOL MINERAL MARKET.

THE firmness of last week has been well maintained. Maganese: Arrivals are small and prices are firmer. Magnesite: Unchanged at 30s. to 35s. for raw lump; raw ground, £6. 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand): Considerably increased sales have been made, and prices are firmer; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk: Considerably more has been doing, and with few exceptions the whole of the arrivals have gone direct into consumption, therefore prices are firmer at 90s. for medium, 95s. to 100s. for best GGB. Barytes (carbonate): The good demand continues. Selected crystal lump is scarce at £6. 5s.; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. China clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn). Pumice-stone in demand; ground, at £8; specially selected lump, finest quality, £11. 10s. Iron ore remains steady; Bilbao and Santander, 7s. 9d. to 8s. f.o.b., Irish, 10s.; Cumberland, 8s. to 12s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone, best brands are in fair demand at £5. 5s. to £5. 15s. for lump, and smalls, £5. Fullers' earth, steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore still in fair demand, and prices are firm. Antimony ore firm; £16 to £22 for fair quality Antimony metal unchanged. Uranium, 29s. to 32s. 6d. Asbestos; best rock, £17 to £18; brown grades, £14 to £15. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine) 17s 6d; more doing. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground £20, £25, and £30; Italian and Bohemian £4 to £12 per ton. French sand in cargoes, 16s. to 17s. Ferromanganese: 80 per cent packed, £11. 2s. 6d.; 70 per cent. packed, £10; 60 per cent. packed, £8. 16s.; 50 per cent. unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. Speigel, 20 per cent., £4. 12s. 6d. Silicon Speigel, 9 per cent., £8. Chrome pig, 10 per cent., £8. 10s. to £10. Bitumen, finest picked, £35. original prime, £18 to £23; and good, £8. Ground Mica, £50.

## LIVERPOOL CHEMICAL MARKET.

A FAIR amount of business has been done during the week, and prices remain unaltered. Soda-ash 1d. up. Caustic soda: 60 per cent. white, £5. 17s. 6d.; 60 per cent. cream, £5. 15s.; 70 per cent. white, £6. 17s. 6d.; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda, 10s. 3d. Soda crystals, £2. 12s. 6d. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100 degrees solution, £4. 17s. 6d.; and 75 degrees solution, £3. 12s. 6d. Bleaching powder £7. 15s. for hardwood, and £7. 10s. softwood. Saltcake 21s. 6d. Bichromate of potash at 4¾d. Bichromate of soda, 3¾d. Carbonate of potash, £18 to £20. Chlorate of potash, 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. 5s. to £12. 10s., strong; lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper, firm at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic), strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia, white, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15: Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes 24s. Pearl ashes, £2. 3s.

## THE LIVERPOOL COLOUR MARKET.

COLOURS are unchanged. Ochres: Oxfordshire is quoted £10, £12, £14, and £16; Derbyshire 50s. to 55s. Welsh, best, 50s. to 55s.; second, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of Zinc: V.M. No. 1, £19; V.M., No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: 2s. 6d. to 3s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

BUSINESS during the past week has been quiet. Some improvement in the demand for chemicals is expected when the mills and works resume operations after the usual Whitsuntide holidays. In Lancashire and Yorkshire during the past week the stoppage of work has been very general. In the alkali trade prices have not undergone any material change. Demand is sufficient to carry off the supply of soda-ash, and prices are unaltered. Caustic soda is rather inclined to droop. Bleaching powder and chlorate of potash are well maintained. Metallic salts are without change. Arsenic is rather firmer in price. Acetates of lime still continue slow of sale. Flake litharge is now easier in price at £15 c.i.f. Carbolic acids are as yet unchanged in value, but the tendency is to lower price, both for the crude and refined products. Picric acid, 1s. 5d. per lb.; prussiate of potash, 6¾d. to 6¾d., according to brand. Potash carbonate and caustic are rather firmer in price. Sulphur in various grades of quality has a lower tendency, and is not likely to improve with the prospects of increased supply. Ammonia salts are quiet, and prices are unchanged.

## THE TAR PRODUCTS MARKET.

THE benzol market is very quiet, and we hear that very low prices have been accepted for 50/90, as low as 2s. 1d. d/d Manchester, while 90's are very flat indeed, it being considered that holders would submit to a substantial reduction for delivery to the end of the year. Solvent naphtha is in good request at former rates, and the same may be said of anthracene. Crude carbolic acid is reported weaker, but we have not heard of any real business being done at lower than current rates. So far as pitch is concerned there does not seem to be the slightest chance of an improvement in price. The only salvation for this article seems to be in the producers of it using it as fuel, seeing that it is far below its fuel price now.

## THE SULPHATE OF AMMONIA MARKET.

THE recent fall in sulphate seems to have founded a demand, and the week ending May 19th saw the largest business done at Hull this year. No less than 465 tons were exported, of which 202 tons went to Hamburg and 203 tons to Antwerp. On Friday in last week the agent of the Gas Light and Coke Company raised his price to £11. 15s., and expected to do a fair business at this figure. Some quantity of London outside makes has been sold at £11. 11s. 3d. for May and June delivery, while at Hull the market closes very firm at £11. 10s.; but for June delivery £11. 12s. 6d. is being asked. Business has been done at Leith at £11. 10s., and as a great many of the dealers are anxious to purchase forward, this may be considered as a very healthy sign.

# The Patent List.

*The following List has been compiled expressly for* THE CHEMICAL TRADE JOURNAL *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Improved Oil Cement.** W. Alber. 7020. May 11.
**Moistening the Atmosphere of Weaving Sheds.** J. H. Kenyon. 7036. May 11.
**Enlarging Photographic Negatives.** J. F. Fetter. 7039. May 11.
**Stoppering Glass Bottles.** E. B. Moyse. May 11.
**Conversion of Chloride of Calcium into Chloride of Magnesium.** G. Borsche and Ferdinand Brünges. 7046. May 11.
**Impregnating Liquids with Carbonic Acid.** C. J. Caspers. 8047. May 11.
**Apparatus for Preparing Sulphite Pulp.** J. S. McDougall, J. T. McDougall, R. K. Hartley, and T. Sugden. 7060. May 11.
**Vessels Lined with Lead or Acid Resisting Metal.** J. S. McDougall, J. T. McDougall, R. K. Hartley, and T. Sugden. 7061. May 11.
**Non-conducting Lagging.** J. Schulte. 7080. May 12.
**Apparatus for Manuring Meadow Land.** A. Browne. 7084. May 12.
**Detergent Compounds of Ammonia.** W. P. Thompson. 7095. May 12.
**Manufacturing Gas.** A. G. Meeze. 7097. May 12.
**Coating Plates with Tin or Terne.** T. Freeman and D. R. Jenkins. 7106. May 12.
**Sodium and Potassium.** W. White. 7123. May 14.
**Separating Storm Water from Sewage.** J. H. Rhodes. 7127. May 14.
**Lubricators.** Sir J. Vogel. 7150. May 14.
**Amalgamating Gold and other Metals.**—(Complete Specification.) S. T. Dahl. 7159. May 14.
**Rotary Polishers.** The Zucher and Levett Chemical Co., U. S. 7160. May 14.
**Improved Preparation of Lemon Juice.** F. F. Shelvey and George Bright. 7162. May 14.
**Furnace for Subjecting Metals to Heat.**—(Complete Specification.) C. D. Abel. 7168. May 14.
**Packing for Steam and other Pistons.**—(Complete Specification.) F. Walker. 7174. May 15.
**Antiseptic Compounds.**—(Complete Specification.) W. P. Thompson. 7177. May 15.
**Treating Ores for the Obtainment of Gold.** J. B. Hannay. 7187. May 15.
**Artificial Fuel.** H. Williams. 7219. May 15.
**Engines with High Range of Temperature.** M. P. W. Boulton. 7227. May 15.
**Concentrating Syrup.** W. M. Sandison. 7228. May 15.
**Stone-breaking Machine.**—(Complete Specification.) V. F. Schubert. 7229. May 15.
**Washing and Sorting Coal.**—(Complete Specification.) R. le Las. 7234. May 15.
**Testing Safety Lamps.** W. Patterson. 7237. May 16.
**Tin and Terne Plates.** T. Price. 7245. May 16.
**Pulverising and Sifting Salt.** G. Appleyard. 7246. May 16.
**Pulping Roots.**—(Complete Specification.) A. McGregor. 7249. May 16.
**Prevention of Waste in Melting and Smelting.** F. Fenton and R. J. Partridge. 7257. May 16.
**Distillery Plant.** J. Death. 7259. May 16.
**Oil Lamps.** J. Crowley. 7271. May 16.
**Sizing Machines.** T. O. Schweitzer. 7273. May 16.
**Machinery for Washing Ores.** R. de Soldenhoff. 7279. May 16.
**Distilling, Purifying, and Concentrating Ammoniacal Fluids.** P. A. Mallet and T. A. Pagnier. 7285. May 16.
**Machine for Utilising Waste Steam.** C. A. H. Laillet. 7292. May 16.
**Slag Manure.** A. Bödtker. 7302. May 17.
**Clarification of Sewage.** A. Fawcett. 7307. May 17.
**Manufacture of Glass.** J. T. H. Richardson. 7309. May 17.
**Accumulator Jars.** J. Kent and F. J. Beaumont. 7321. May 17.
**Improved Electrolytes for Electric Batteries.** R. McKenzie. 7333. May 17.
**Apparatus for the Distillation of Tar.** F. Lennard. 7334. May 17.
**Fuel Economisers.**—(Complete Specification.) J. Tirbill. 7354. May 17.
**Linoleum and other Floor Coverings.** G. A. Harrison. 7356. May 17.
**Thermometers.** T. P. C. Crampton. 7357. May 17.
**The Manufacture of Compounds and their Utilisation as Printing Surfaces.** A. J. Parker. 7358. May 17.

# New Companies.

BARCLAY & SONS LIMITED (PATENT MEDICINE VENDORS).—Capital, £100,000 in £5 shares.
KETTERING DAIRY.—Capital, £3,000 in £10 shares.
LEADVILLE MINES.—Capital, £210,000 in £1 shares.
LONDON PAPER STOCK AND TRADING.—Capital, £2,000 in £1 shares.
MARSDEN CHEMICAL.—Capital, £25,000 in £10 shares.
MORGAN GOLD MINING.—Capital, £210,000 in £1 shares.
PACIFIC AND ORIENTAL PETROLEUM.—Capital, £400,000 in £5 shares.
SCHULKE GAS LAMP.—Capital, £50,000 in £1 shares.
TRADING AND BREWERY COMPANIES TRUST.—Capital, £1,000,000 in £10 and £1 shares.
WATERWORKS, GAS, AND GENERAL LIGHTING.—Capital, £1,000,000 in £10 shares.
WENHAM.—Capital, £250,000 in £1 shares.
YORKSHIRE PEAT MOSS LITTER.—Capital, £51,000 in £10 and £1 shares.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

E. CANNON, sen., B. CANNON, W. J. CANNON, and E. CANNON, jun., Dublin and Lincoln, leather dressers and glue manufacturers.
MELLOR, JEPSON, AND MELLOR, Eastwood Pottery, Nottinghamshire, stone bottle manufacturers.
GEORGE WELLS AND CO., North-street, Westminster, engineers and contractors.
BROOKS AND TAYLOR, Birmingham, ironfounders.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

SHELLARD, NATHAN JOHN, Monmouth, trading with G. Lindsay as the Monmouth Colour Company, paint and colour manufacturer.
SIMPSON, HENRY, Kingston-upon-Hull, fat refiner.
GREEN, FREDERICK CHARLES, Northampton, currier.
HIGGINS, JOHN, Pewsey, Wiltshire, chemist and druggist.

### First Meetings and Public Examinations.

BAKER, FRANCIS ROBERT, Birmingham, late of South Littleton, near Evesham, manufacturing inventor. First meeting, June 5, 25, Colmore-row, Birmingham. Public examination, June 14, County Court, Birmingham.
BRIER, LEONARD MORSE, Bridge House Hotel, London-bridge, late of Manor-lane Oil Works, Galley Wall-road, Bermondsey, and Bushey-hill-road, Camberwell, hotel keeper, late oil manufacturer. May 25, 33, Carey-street, Lincoln's-inn; June 13, 34, Lincoln's-inn-fields.

### Adjudications.

KROLL, LUDWIG (trading as L. Kroll and Co., and the British Hygienic Company), Blundell-street, Caledonian-road, late of Mark-lane, City, chemical engineer.
MEAKIN, RICHARD, Newton Burgoland, Leicestershire, brick and tile manufacturer.
SHELLARD, NATHAN JOHN, Monmouth, trading with G. Lindsay, as the Monmouth Colour Company, paint and colour manufacturer.
HIGGINS, JOHN, Pewsey, Wiltshire, chemist and druggist.

### Notices of Dividends.

JOHNSTON, JOHN, Dalston, Cumberland, tile manufacturer. First and final dividend of 1s. 1¼d., on and after May 22, Official Receiver's offices, Carlisle.
HAZLEWOOD, CHARLES (trading as William Hazlewood), Tanner's-hill and Brockley-road, Deptford, oil and colourman. First and final dividend of 9d., May 22, 109, Victoria-street, Westminster.
PETHER, SAMUEL, and PETHER, WILLIAM ROBERT, Lombard-road, Battersea, engineers. First and final dividend of 3d., May 23, 109, Victoria-street, Westminster.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 12th.*

**Acetic Acid—**
France, 1 ck. Arnati & Harrison
" 1 E. Rimmel
Holland, 66 cbys. Beresford & Co.
" 90 "

**Acetate of Lime—**
U. States, 70 bags. M. D. Co.

**Alum—**
France, 17 tcs. Middleton & Co.

**Alkali—**
France, 220 c. Arnati & Harrison

**Bones—**
U. States, 14 t. Flack, Chandler & Co
" 13 "

**Brimstone—**
France, 1 t. W. Balchin
" 2 J. Terry & Co.
Italy, 100 t W. C. Bacon & Co.
" 20 C. W. Ashton
" 5 F. Smith
" 100 McDougall Bros.
" 100 W. C. Bacon & Co.
" 9 Clift, Nicholson & Co.
" 200 Clippingdale & Thornhill
" 2 W. Balchin

**Barytes—**
Holland, 22 cks. E. & G. Hirsch & Co.

**Barytes**—*continued.*
Holland, 23 cks B. Winstone & Sons
" 22 A. Boetz
" 7 W. Harrison & Co.
" 68 S. Ward & Co.
Germany, 43 W. Harrison & Co.
Belgium, 21 "
" 20 Ross & Deering
" 23 W. Harrison & Co.
" 1 "
" 25 A. Zumbeck & Co.

**Barium Chloride—**
Germany, 11 cks. Petri Bros.

**Caoutchouc—**
Belgium, 54 c. Kebbel, Son & Co.
Madagascar, 3 Blythe, Green & Co.
" 3 "

**Caoutchouc**—*continued.*
E. Indies, 23 c. Kebbel, Son & Co.
" 13 "
Aden, 97 c. Clarke & Smith
" 46 L. & S. K. D. Co.
" 77 Anderson, Weber & Smith
" 69 Elkan & Co.
" 193 Clarke & Smith
" 21 W. M. Smith & Sons
" 10 Wallace Bros.
" 9 L. & S. K. D. Co.
" 18 Wrightson & Son
A. Turkey, 18 c. Major & Field
Zanzibar, 43 Hale & Son

**Ceresine—**
Germany, 51 bgs. Ross & Deering

**Cream Tartar—**
Spain, 4 cks. Webb, Water & Co.
" 13 "
France, 7 "
" 10 C. F. Gerhardt
" 22 Webb, Warter & Co.
" 10 "
" 10 Sutcliffe & Gosden
" 2 Webb, Warter & Co.
Italy, 35 W. Allen
" 20 W. C. Bacon & Co.
" 4 T. W. Boord.
" 8 A. Laming & Co.

**Carbolic Acid—**
Holland, 3 cyldrs. Carey & Sons

**Chemicals** *(otherwise undescribed)*
Germany, £22 Craven & Co.
" 8 T. H. Lee
" 305 A.&M.Zimmermann
" 16 Schenker & Co.
" 30 Seaward Bros.
" 18 T. H. Lee
" 15 Thomas & Dawes
" 94 A.&M.Zimmermann
" 760 "
" 102 "
" 70 Thomas & Dawes
France, 9 Burgoyne, Burbidges and Co.
" 9 Weatherley, Mead and Co.
Holland, 8 C. W. Ashton
" 30 Beresford & Co.

**Dextrine—**
Germany, 300 sks. Ross & Deering
" 300 Williams, Torrey & Co.

**Dyestuffs—**
**Argols**
Spain, 21 bgs. F. J. Besley & Co. Ld.
Italy, 465 B. Jacob & Sons
France, 2 cks. N. Steinberg
**Alizarine**
Holland, 63 cks. Burt, Boulton & Co.
**Cutch**
France, 5 bls. Atkins & Nisbet
E. Indies, 2,000 bxs. E. & W. I. D. Co.
**Annatto**
Norway, 6 pkgs. Johnsen & Jorgensen
Holland, 4 cks. Fullwood & Bland
France, 3 cs. Hurford & Middleton
**Extracts**
France, 50 cks. G. S. N. Co.
U. States, 740 Adamson & Ronaldson
France, 10 Prs. Chamberlain Wrf.
Denmark, 1 Fulwood & Bland
U. States, 20 bxs. W. R. Grizzell
**Gambier**
E. Indies, 423 bls. E. Boustead & Co.
" 269 bgs. H. Lambert
**Indigo**
E. Indies, 9 chts. Patry & Pasteur
" 108 L. & S. K. D. Co.
" 90 E. & W. I. D. Co.
" 29 "
" 119 R. von Glehn & Sons
" 14 T. H. Allan & Co.
" 2 D. E. Somech
" 41 L. & S. K. D. Co.
" 9 E. & W. I. D. Co.
" 6 Elkan & Co.
" 8 L. & S. K. D. Co.
" 33 Rehder & Co.
" 15 Ross & Deering
" 34 L. & S. K. D. Co.
" 2 bxs. 24 chts. N. S. S. Co.
Holland, 17 cs. Langstaff and Co.
**Madder**
Holland, 3 cks. Skilbeck Bros.
**Myrabolams**
E. Indies, 300 bgs. Armitage, Fry, and Co.
" 791 E. & W. I. D. Co.
" 1,366 J. P. Alpe & Co.
" 930 Humphery & Co.
**Orchella**
E. Indies, 9 bls. Hale & Son
**Shumac**
Italy, 100 bgs. Prs. Brook's Whrf.
" 20 R. Alexander & Co.
" 20 "
" 100 F. Roberts
**Tanners' Bark**
Germany, 5 c. E. & W. I. D. Co.
Melbourne, 11 t. J. Swire & Sons
" 59 Hicks, Nash & Co.
" 104 Baxter & Hoare
Belgium, 28 Vokins & Co.
Adelaide 26 Devitt & Hett
**Turmeric**
E. Indies, 500 bgs. Lewis & Peat
" 200 E. & W. I. D. Co.
**Weld**
France, 3 bls. N. Steinberg

**Glycerine—**
Holland, £335 Spies Bros. & Co.
" 519 "
Germany, 220 Beresford & Co.
" 66 "

**Gutta Percha—**
E. Indies, 300 c. J. H. & G. Scovell

**Guano—**
Sweden, 51 t. M. D. Co.

**Glucose—**
Germany, 160 c. Proprs. Chamberlain Wharf
" 400 P. Windmuller
" 130 Baxter & Hoare
" 1,245 J. F. Ohlmann
" 32 Domeier & Co.
" 227 Tolme & Runge
" 460 E. Pink & Sons
" 30 C. S. Lovell
" 245 Andorsen, Becker and Co.
" 200 J. Barber & Co.
" 100 H. A. Litchfield & Co.
" 550 J. Elinguis
" 200 L. Sutro & Co.
" 144 P. Windmuller
" 200 M. D. Co.
" 180 Pillow, Jones & Co.
" 270 Tolme & Runge
" 1,720 Anderson, Weber & Co
" 444 Prs. Chamberlain Wrf
" 1,872 Seaward Bros.
" 280 J. Knill & Co.
" 215 P. Windmuller
" 100 Baxter & Hoare
France, 240 M. H. Voss
" 150 Barrett, Tagent & Co.
" 100 Trier, Meyer & Co.
" 200 W. H. Carey & Sons
" 480 M. H. Voss
" 200 Carey & Sons
Holland, 233 J. von der Putte

**Isinglass—**
U. States, 13 c. Knight & Morris
E. Indies, 6 cs. E. & W. I. D. Co.

**Manure—**
**Superphosphate**
Holland, 10 t B. Jacob & Son
" 50 Anglo Guano Works
**Gypsum**
France, 200 t. J. Burnett & Sons
" 250 "
**Phosphate**
France, 130 t. D. de Pass & Co.
**Kainit**
Germany, 240 t. F. W. Berk & Co.
" 55 "
**Salt**
Germany, 20 t. L. Knoblauch
" 20 Hunter, Waters & Co.
" 100 Agricultural and Horticultural Society
" 50 B. Jacob & Son
**Phosphate Rock**
Belgium, 110 t Silvertown Manure Co.
" 260 Anglo Guano Works
**Stone**
France, 50 t. J. Burnett & Sons

**Naphtha—**
U. States, 60 brls. Lister & Biggs

**Potash**
France, 66 c. M. H. Voss
" 237 J. Thredder, Son & Co.
Germany, 580 H. Lambert

**Plumbago**
Germany, 25 cks. Sawer, Mead & Co.
" 195 Brown & Elmslie
Italy, 145 J. Thredder, Son & Co.
E. Indies, 304 "

**Potassium Prussiate—**
Germany 12cks. A. & M. Zimmermann

**Potassium Sulphate—**
Germany, 10 cks. H. Lambert
" 20 "
Belgium, 200 bgs. B. Jacob & Sons
France, 52 cks. Petri Bros.
" 60 W. H. Carey & Sons

**Paraffin Wax—**
U. States, 1,026 brls. J. H. Usmar & Co

**Pitch—**
Belgium, 35 brls. L. & N. W. Ry. Co.
France, 42 pkgs. H. Hill & Sons

**Potassium Bicarbonate—**
Holland, 15cks. A. & M. Zimmermann

**Salicylic Acid—**
Germany, 24 cs. Burgoyne, Burbidges & Co.
" 13 "

**Sodium Acetate—**
Germany, 10 cks. Augspurg, Hopf and Co.
France, 8 Lister & Biggs
" 7 Hunter, Waters & Co.
" 6 "
Belgium, 41 brls. Leach & Co.

**Stearine—**
Belgium, 130 bgs. W. Balchin
" 64 H. Hill & Sons
France, 95 "

**Sulphur Chloride—**
Holland, 20 cs. R. Morrison & Co.

**Sodium Nitrate—**
Pisagua, 5,571 bgs. Montgomery & Co
Iquique, 8,846 H. Bath & Sons

**Saltpetre—**
Germany, 60 cks. T. Merry & Son
" 45 J. Hall & Son
" 56 "

**Sodium Hyposulphite—**
Holland, 100 c. Beresford & Co.

**Tartaric Acid—**
Italy, 40 cks. Webb, Warter & Co.
" 20 "
" 20 "
Holland, 2 C. Christopherson & Co.
" 15 Webb, Warter & Co.
" 9 pkgs. Middleton & Co.
" 4 cks. "

**Tin Oxide—**
Germany, 4 cks. H. Lambert

**Ultramarine—**
Germany, 26 pkgs. G. Steinhoff
" 60 cks. 20 cs. "
" 10 "
" 40 Ohlenschlager Bros.
" 10 cs. 24 cks. G. Steinhoff
" 21 pkgs. H. Bowles & Co.
Holland, 26 Seaward Bros.
" 7 cs. Haeffner & Co.
" 3 Ross & Deering
France, 1 ble. G. Rahn & Co.

**Verdigris—**
France, 1 ck. J. H. & G. Scovell
U. States, 3 cks. F. Fink & Co.

**Zinc Oxide—**
Holland, 27 cks. Beresford & Co.
" 2 Phillipps & Graves
" 25 H. Koanigs & Co.
" 33 Beresford & Co.
" 33 "
" 60 brls. M. Ashby
Germany, 100 cks. J. Matton

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## LIVERPOOL.

*Week ending May 16th.*

**Alum—**
Rottermam, 42 cks.

**Albumen—**
Havre, 6 cks. Cunard S.S. Co.

**Bones—**
Boston, 380 cks. J. Gordon

**Boracic Acid—**
Leghorn, 16 cks. Shrop. Union Co.

**Borax—**
Calcutta, 93 bgs.
Havre, 37 cks. Cunard S.S. Co.

**Bone Meal—**
Bombay, 3,473 bgs.

**Bones, Crushed—**
Bombay, 1,400 bgs.

**Brimstone—**
Catania, 75 t.

**Chemicals** *(otherwise undescribed)*
Rotterdam, 4 cks.
" 2
Bordeaux, 1 cs.
New York, 1,599 bgs.

**Caoutchouc—**
Para, 275 cs. Singlehurst & Co.
" 8 Baird & Co.
" 91
Lisbon, 518 bgs.
" 124 2 cks.
Rotterdam, 236 bls.

**Camphor—**
Hamburg, 1 ck.

**Charcoal—**
St. Nazaire, 95 sks.

**Cream Tartar—**
Barcelona, 13 hds. 3 bts.
Tarragona, 7

**Dyestuffs—**
**Annatto**
Para, 30 bskts. Bieber & Co.
**Shumac**
Venice, 50 bgs.
Catania, 25 bls.
Palermo, 100 100 bgs.
Catania, 50 bgs. C. Tennants & Co.
" 50
**Orchella**
Lisbon, 91 bls. A. Benchinsk
**Extracts**
New York, 10 brls.
" 5 100 bxs.
Havre, 6 cks. Cunard S.S. Co.

**Dyestuffs**—*continued.*
**Valonia**
Corfu, 135 bgs. S. Levy & Co.
Patras, 609
**Myrabolams**
Bombay, 1,118 pkts. 2,507 bgs.
**Madder**
Marseilles, 1 brl.
**Argols**
Catania, 4 cks.
**Divi Divi**
Havre, 331 bgs. Cunard S.S. Co.

**Dextrine—**
Hamburg, 1 bg.

**Glucose—**
Hamburg, 50 cks. 120 bgs.
New York, 200 sks. White, Genn and Co.

**Guano—**
St. Nazaire, 24 bgs.

**Glycerine—**
Venice, 24 cks.

**Horn Piths—**
Hamburg, a quantity.
Antwerp, 5½ t.

**Iodine—**
Valparaiso, 98 brls. A. Gibbs & Son
" 6 "

**Manure—**
**Phosphate**—St. Valery, 280 t.
**Kainit**—Hamburg, 1,000 bgs.

**Pyrites—**
Huelva, 1,492 t. Matheson & Co.
" 1,625 "
" 1,332 Tennants & Co.
" 946
" 1,126 Matheson & Co.
" 1,823 "
" 1,430 "

**Pearl Ash—**
Boston, 6 brls.

**Potash—**
Boston, 36 brls.

**Pitch—**
Havre, 37 cks. Cunard S.S. Co.

**Salts of Potash—**
Hamburg, 397 bgs.

**Stearine—**
Antwerp, 25 bgs. Fletcher & Co.
Rotterdam, 250
New York, 62 hds.

**Soda—**
Antwerp, 4 cks.
" 1 cs.

**Sulphur Ore—**
Pomaron, 16,218 bgs. Mason & Barry

**Saltpetre—**
Calcutta, 1,390 bgs.

**Sodium Nitrate—**
Caleta Bucua, 11,570 bgs. Baring Brs.

**Sulphur—**
Marseilles. 50 bgs. T. Talbena & Co.
Catania, 250
" 100 t.

**Tartaric Acid—**
Rotterdam, 22 cks. 5 kgs.
" 14
" 22
Bordeaux, 17 hds.

**Tartar—**
Bari, 38 bgs. 117 cks.
Bordeaux, 3
Naples, 3
" 3 R. Powles
" 2 "
Havre, 169 sks.

**Talc—**
Bordeaux, 50 sks.

**Tar—**
Marseilles, 25 cks.

**Ultramarine—**
Rotterdam, 18 cs. 27 cks.
Terneuzen, 10

**Zinc Oxide—**
Rotterdam, 60 cks. O. & H. Marcus
Antwerp, 35 brls. J. T. Fletcher & Co.

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## GLASGOW.

*Week ending May 17th.*

**Acetic Acid—**
Rotterdam, 17 balloons

**Acid** *(otherwise undescribed)*—
Hamburg, 2 dms.

**Barytes Sulphate—**
Antwerp, 12 cks.

**Chemicals** *(otherwise undescribed)*
Antwerp, 10 cks.

**Dyestuffs—**
**Extracts**—Antwerp, 42 cks.
**Madder**
Rotterdam, 2 cks.
**Alizarine**
Rotterdam, 11 cks.
**Dextrine—**
Hamburg, 101 bgs.
**Fluorchrome—**
Rotterdam, 2 cks.
**Naphtha—**
Rotterdam, 2 dms.
**Pyrites—**
Huelva, 1,190 t.
**Potash—**
Rotterdam, 64 cks.
**Soda—**
New York, 5 cks.
Rotterdam, 100 bgs.
**Tannin—**
Hamburg, 8 cs.
**Zinc Oxide—**
Rotterdam, 15 cks.

## HULL.

*Week ending May 17th.*

**Acetic Acid—**
Rotterdam, 15 bkts. Lawson&Sons
**Alum—**
Rotterdam, 23 cks. Lawson&Sons
**Albumen—**
Naples, 17 cs. Wilson, Sons, & Co.
**Barytes—**
Antwerp, 46 brls. H. F. Pudsey
**Brimstone—**
Naples, 20 bgs. Wilson,Sons,&Co.
**Bones—**
Bremen, 1 cs. J. Pyefinch & Co.
**Chloride of Sulphur—**
Rotterdam, 10 dms. Lawson&Sons
**Chemicals** *(otherwise undescribed)*
Antwerp, 35 pkgs. Wilson,Sons&Co.
Hamburg, 23 cks. "
Dunkirk, 109 pkgs. "
Naples, 5 cks. "
" 7 G. Latus & Co.
Bremen, 10 kgs. 5 blns. 4 cks. Veltmann & Co.
Dunkirk, 9 pkgs. Wilson,Sons&Co.
**Dyestuffs—**
**Alizarine**
Rotterdam, 8 cks. Hutchinson&Son
" 36 brls. Lawson & Sons
" 80 cks. W.&C.L.Ringrose
" 37 "
" 32 pks. "
" 48 cks. Hutchinson&Son
**Indigo**
Amsterdam, 4 chs. W.&C.L.Ringrose
Antwerp, 1 cs. Wilson, Sons & Co.
**Madder**
Rotterdam, 15 cks. Wilson,Sons&Co.
Naples, 2 "
Rotterdam, 2 Hutchinson&Son
**Shumach**
Naples, 100 bgs. Wilson,Sons&Co.
**Extracts**
Rouen, 100 cs. 52 cks. Rawson and Robinson
**Dextrine—**
Hamburg, 10 bgs.
" 100
**Glucose—**
Hamburg, 10 cks.
Stettin, 2,000 bgs. Lofthouse & Co.
" 20 cks. Rawson&Robinson
Dunkirk, 60 bgs. Wilson,Sons&Co.
**Manure—**
**Manure** *(otherwise undescribed)*
Antwerp, 105 bgs.
Hamburg, 700 Lawson & Sons
Ghent, 150 t. Wilson, Sons & Co.
**Waste Salt**
Hamburg, 50 t. C. Wilburn
" 100 bgs.
**Kainit**—Hamburg, 50 bgs.
**Pitch—**
Antwerp, 29 brls. Jackson & Son
**Stearine—**
Antwerp, 10 cks. Wilson,Sons&Co.
**Saltpetre—**
Hamburg, 16 kgs. Lofthouse & Co.
**Tannic Acid—**
Rotterdam, 9 cks. Hutchinson&Son
**Tartaric Acid—**
Rotterdam, 4 cks. Hutchinson&Son
**Tar—**
Dunkirk, 2 cs. Wilson, Sons & Co.
Naples, 50 cks. "

## TYNE.

*Week ending May 18th.*

**Acetic Acid—**
Rotterdam, 16 cbys. Tyne S.S. Co.
**Bones—**
Christiania, 210 bgs.
**Barytes—**
Rotterdam, 250 bgs. Dawson & Co.
**Copper Precipitate—**
Huelva, 234½ t. Scott Bros.
**Manure—**
**Phosphate**
Antwerp, 190 t. Langdale Chemical Manure Co.
Antwerp, 230 " "
**Pyrites—**
Huelva, 1,283 t. Scott Bros.
Pomaron, 1,200 t. Mason & Barry

## GRIMSBY.

*Week ending May 12th.*

**Charcoal—**
Hamburg, 40 pkgs.
**Chemicals** *(otherwise undescribed)*
Hamburg, 3 pkgs.
**Manure—**
**Kainit**—Hamburg, 300 bgs.
**Potash—**
Hamburg, 10 cks.
**Zinc Ashes—**
Antwerp, 19 cks.
" 19

## GOOLE.

*Week ending May 9th.*

**Caustic Potash—**
Calais, 40 dms.
**Chemicals** *(otherwise undescribed)*
Hamburg, 7 cks.
**Saltpetre—**
Antwerp, 170 bags

# EXPORTS OF CHEMICAL PRODUCTS

FROM

## THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*May 9th, 10th, and 11th.*

**Ammonia Carbonate—**
Yokohama, 34 cs. £60
**Alum Cake—**
Calcutta, 32 t. 18 c. £100
**Acetic Acid—**
Sydney, 10 cks. £27
**Ammonia Sulphate—**
Martinique, 20 t. £255
**Carbolic Crystals—**
Yokohama, 10 cs. £78
**Collodion—**
Yokohama, 4 cs. £66
**Chemicals** *(otherwise undescribed)*
Melbourne, 22 kgs. £130
Sydney, 58 cks. 8 pkgs. 50 kgs. 709
Shanghai, 15 kgs. 78
**Cream Tartar—**
Sydney, 2 t. 8 c. £300
Wellington, 3 19
**Caustic Soda—**
Sydney, 26 t. 13 c £184
Fremantle, 1 10 14
**Citric Acid—**
Hamburg, 3 c. £30
St. Petersburg, 10 87
**Disinfectants—**
Marseilles, 4 cs. £60
**Fire Extinguishing Fluid—**
Moscow, 77 crates. £450
**Guano—**
Antigua, 140 bgs. £110
**Manure—**
Trinidad, 25 t. 13 c. £330
Havre, 4 18 50
Barbadoes, 50 600
Antigua, 7 tcs. 35
Lyttleton, 35 t. 150
Sydney, 17 c. 13
Martinique, 13 13 375
**Nitric Acid—**
Yokohama, 4 cs. £10
**Phosphorus—**
Yokohama, 10 cs. £154
Hiogo, 2 21
**Potassium Chlorate—**
Sydney, 10 t. £520
**Soda Ash—**
Sydney, 5 t. 1 c. £28
**Soda Crystals—**
Sydney, 52 t. 2 c. £122
**Sulphur—**
Madeira, 2 t. 4 c. £22
**Sulphur, Flowers—**
Madeira, 100 brls. £81
**Sodium Bicarbonate—**
Wellington, 1 t. £6
**Saltpetre—**
Gothenburg, 1 t. £21
**Soda—**
Gibraltar, 5 t. 7 c. £14
**Sheep Dip—**
Algoa Bay, 2 t. 10 c. £140
**Tartaric Acid—**
Melbourne, 1 t. 10 c. £172
Adelaide, 3 25
Wellington, 3 25
Sydney, 5 43

## LIVERPOOL.

*Week ending May 16th.*

**Ammonia Sulphate—**
Las Palmas, 9t. 17 c. 3 q. £115
Havre, 5 2 1 59
Antwerp 20 3 0 241
Valencia 115 10 0 1,321
**Ammonia Carbonate—**
New York, 5 11 c. £207
Philadelphia, 5 t. 10 3 q. 155
**Alum—**
Syra, 2 t. 1 c. £10
Melbourne, 7 0 3 q. 42
Galatz, 3 8 2 20
Barcelona, 5 8 32
Havana, 5 4 30
Salaora, 0 13 1 5
**Alumina Sulphate—**
Passages, 5 t. 3 c. £28
**Ammonia Muriate—**
Philadelphia, 23 t. 13 c. 2 q. £538
New York, 5 6 130
Boston, 3 9 85
**Albumen—**
New York, 1 t. £60
**Acetic Acid—**
Vera Cruz, 12 bs. £32
**Bleaching Powder—**
Boston, 302 tcs. 246 cks.
Ghent, 135
Montreal, 30 brls. 5
New York, 19
Norrkoping, 5
Oporto, 34
Santander, 14
Seville, 11 brls.
Vera Cruz, 11
**Borax—**
Corunna, 2 cks. £13
Newfairwater, 16 c. 2 q. 83
**Blood, Dried—**
New York, 5 t. £110
**Bones—**
Rouen, 5 t. 5 c. £33
Stockholm, 5 14 1 q. 56
**Barytes—**
Madras, 3 t. 13 c. £19
**Caustic Soda—**
Amsterdam, 21 dms.
Bahia, 30
Barcelona, 10 brls. 110
Batoum, 100
Bilbao, 10
Boston, 50
Calcutta, 153
Ceara, 3
Copenhagen, 6 cks. 10
Fairwater, 135
Galatz, 25
Genoa, 255
La Guayra, 16
Leghorn, 12
Lima, 55
Malaga, 108 kgs. 20 brls. 34
Marseilles, 50 hds.
Melbourne, 60
Montreal, 231
Naples, 16
Newfairwater, 179
New York, 272
Odessa, 4
Oporto, 30
Passages, 59
Philadelphia, 400
Rotterdam, 20 kegs 70
Rouen, 8 cks. 87
St. Petersburg, 50 cks.
Seville, 25 brls. 75
Stettin, 92
Sydney, 56
Syra, 20
Tampico, 20 kgs.
Tarragona, 50
Terneuzen 36
Valencia, 16
Yokohama, 300
Zante, 285
**Copper Sulphate—**
Ghent, 2 t 12 c. 1 q. £50
Buenos Ayres, 1 18 45
Rio Janeiro, 2 0 2 q. 47
Bombay, 2 49
Vera Cruz, 20 11 764
Rouen, 39 10 739
St. Johns, N.F. 3 0 2 70
Bordeaux, 49 16 1 1,046
Havana, 0 10 3 11
**Chemicals** *(otherwise undescribed)*
Leghorn, 0 t. 15 c. £3
Odessa, 8 4 37
Fairwater, 3 11 3 q. 10
Bangkok, 0 15 2
Antwerp, 7 7 1 2
Stockholm, 3 11 3 1
Rotterdam, 5 3 0 1
Mersyne, 0 3 0
Constantinople, 6 1
**Caustic Potash—**
Hamburg, 7 c. £
**Carbolic Acid—**
Havre, 0 t. 4 c. 1 q. £
New York, 13 5 1,2
Rotterdam, 12 4
Boston, 1 5 1
**Carbolic, Solid—**
Rouen, 1 t. 6 c. £1
**Copperas—**
Syra, 8 t. 8 c. 2 q. £
Constantinople, 4 3
Dantzic, 7 17 2
**Charcoal—**
Rouen, 1 t. 5c.
New York, 31 6 1
Stettin, 155 6
**Cobalt Oxide—**
Gijon, 1 c. £
**Cream Tartar—**
New York, 10 t. £1,1
**Disinfectant—**
Kingston, 1 c.
**Epsom Salts—**
Halifax, 10 brls.
**Glycerine—**
Hamburg, 9 t. 10 c. £1
**Hydroleine—**
New York, 15 t. £
**Iodine—**
New York, 6 c. 2 q. £5
Hamburg, 4 t. 2,4
**Magnesia—**
Constantinople, 10 tcs.
Monte Video, 10 cs.
Pernambuco, 10
**Nitrate of Lead—**
Vera Cruz, 6 c. £7
**Oxalate Potash—**
Barcelona, 4 t. 2 c. £12
**Oxalic Acid—**
Antwerp, 16 c. 2 q. £25
**Pitch—**
Naples, 100 t.

**Potassium Chlorate—**
Montreal, 1 t. 0 c. £54
Copenhagen, 3 0 164
Naples, 2 1 107
Hamburg, 0 10 27
Rotterdam, 1 0 54
St. Petersburg, 41 10 2,208
Vera Cruz, 0 5 14
Genoa, 0 3 13
New York, 6 10 346
Santander, 0 10 27
Newfairwater, 0 10 25
Antwerp, 1 0 50

**Potassium Bichromate—**
Oporto, 0 t. 4 c. £8
Havre, 3 95
Marseilles, 2 12 3q. 32
Rouen, 5 7 2 163
Antwerp, 2 2 74
Norrkoping 10 3 1 410

**Potashes—**
Catania, 2 t. 6 c. £55
Bordeaux 1 8 3 q. 34

**Potassium Prussiate—**
Norrkoping, 3 t. 1 c. £203

**Refining Acid—**
Trinidad, 8 c. £25

**Salt—**
Amsterdam, 239 t.
Antwerp, 70
Brisbane, 175
Beunos Ayres, 30
Calcutta, 3,543
Cameroons, 53
Chicago, 65
Diamond Island, 1,875
Gaboon, 25
Gefle, 366
Isles de Los, 20
New York, 130
Rotterdam, 100
Salt Pond, 10
Sinol, 20

**Soda Ash—**
Bahia, 10 brls.
Baltimore, 134 tcs. 82 cks.
Boston, 78 132
Buenos Ayres, 200
Chicago, 30
Corfu, 20 brls.
Ghent, 42 cks.
Melbourne, 49 271
Montreal, 13
New York, 403 tcs. 163
Odessa, 80 brls. 36
Oporto, 3 tcs.
Patras, 30 brls.
Philadelphia, 292 tcs. 375 cks.
Rio Janeiro, 100 brls.
San Francisco, 68 tcs.
Zante, 20 brls.

**Sodium Bicarbonate—**
Barcelona, 100 kgs.
Bilbao, 20
Calcutta, 600
Copenhagen, 25
Genoa, 10 cks. 8 pkgs. 50
Hamburg, 76 brls.
Leghorn, 45
Marseilles, 2 t. 13 c.
Melbourne, 430
Messina, 26
Montreal, 10
Naples, 2 cks. 58
New York, 134 brls.
Odessa, 110

**Soda Crystals—**
Brisbane, 100 brls.
Malta, 50
New York, 125 cks.
Smyrna, 100
Zante, 50

**Sodium Silicate—**
Malaga, 4 brls.
Seville, 17

**Sodium Carbonate—**
Boston, 140 brls.
Genoa, 1 ck.

**Soap Powder—**
Ghent, 2 t. £70
Antwerp, 3 105

**Saltpetre—**
Ceara, 9 c. 3 q. £11
Bahia, 3 t. 18 2 97
Syra, 2 10 54
Vera Cruz, 1 3 2 25
Santos, 3 18
Maranham, 9 10
Cadiz, 5 110
Pernambuco, 10 14 243

**Salammoniac—**
Mersyne, 3 c. £5
Syra, 5 8
Philadelphia, 4 t. 13 1 q. 149
Norrkoping, 10 3 17
Newfairwater 14 2 22

**Salammoniac—***continued.*
Smyrna, 0 t. 15 c. 3 q. £31
Odessa, 1 5 48

**Sulphur—**
Oporto, 2 t. 4 c. 1 q. £19
Pernambuco, 1 14 16
Matanzas, 12 4
Rouen, 10 1 49

**Sodium Nitrate—**
Palermo, 2 t. 14 c. £26
Malaga, 5 3 50
Lisbon, 50 3 2 q. £475
New Orleans, 100 12 993

**Sodium Chlorate—**
Boston, 1 t. 5 c. £84

**Saltcake—**
Baltimore, 315 t. 19 c. £577

**Sodium Bichromate—**
Piræus, 5 t. 0 c. 3 q. £155
Antwerp, 5 7 0 161

**Soap Extract—**
Melbourne, 8 t. 5 c. £276

**Superphosphate—**
Teneriffe, 7 t. 12 c. 3 q. £30

**Tin Oxide—**
Montreal, 6 c. £54

**Zinc Chloride—**
Montreal, 1 t. 2 c. 3 q. £23
Rouen, 1 7 23
Bombay, 2 11 60

**Zinc Oxide—**
Maceio, 8 c. £7

## GLASGOW.

*Week ending May 12th.*

**Alum, Lump—**
Italy, 47 t. 0 c. £205
Venice, 5 10 23
Lisbon, 5 8 25
Hammerfest, 1 0 5
Calcutta, 31 15 308

**Anthracene—**
Rotterdam, 84 cks. £800

**Acid** *(otherwise undescribed)—*
Madras, 4 t. 2 c. £45

**Ammonia Muriate—**
Italy, 2 t. 3 c. £50

**Borax—**
Austria, 11 c. £20

**Bichromate of Potash—**
Stockholm, 2 cks. £30
" 1 16

**Benzene—**
Hammerfest, 15 cks. £40

**Caustic Soda—**
Calcutta, 2 t. 12 c. £21
Rotterdam, 32 tins. 5

**Chemicals** *(otherwise undescribed)*
Lisbon, 4 c. £23

**Dyestuffs—**
Aniline
Calcutta, 3½ c. £57

**Epsom Salts—**
Stockholm, 5 t. 0 c. £40
Montreal, 8 6 30

**Flint, Ground—**
Seville, 223 t. £379

**Manganese, Recovered—**
Italy, 5 t. £43

**Paraffin Wax—**
New York, 12 t. 18 c. £425
Venice, 5 8 122
Italy, 4 10 105

**Potassium Bichromate—**
taly, t. 8 c. £182
" 15 12 542

**Potassium Chlorate—**
Lisbon, 1 t. £56

**Potassium Prussiate—**
Montreal, 1 t. 7 c. £76

**Sodium Bicarbonate—**
Italy, 35 t. 13 c. £1,034

**Sugar of Lead—**
Calcutta, 3 t. 5 c. £90

**Tar—**
Stockholm, 140 brls. £24
Hammerfest, 10 cks. 6

## HULL.

*Week ending May 15th.*

**Alkali—**
Drontheim, 8 cks.

**Bleaching Powder—**
Drontheim, 31 cks.
" 31

**Chemicals** *(otherwise undescribed)*
Abo, 2 cks. 50 pkgs.
Amsterdam, 7
Antwerp, 1 cs. 8 cks.
Bordeaux, 16 pks. 30 cks.
Dantzic 4
Dunkirk, 55 cks.
Gothenburg 7 cs. 34 cks. 10 pkgs.
Helsingfors, 1 cs. 20 pks.
Hamburg, 300 cs. 114 cks.
Harlingen, 10 cks.
Lisbon, 5 cs. 40 cks.
Norrkoping, 11 pks.
Rotterdam, 10 cs. 94 cks. 100 pks.
Rouen, 27 cks.
St. Petersburg, 180 cks. 753 pks.
Stockholm, 1 cs.

**Caustic Soda—**
Antwerp, 15 dms.
Helsingfors, 12
St. Petersburg, 873

**Dyestuffs—**
Gothenburg, 1 ck.
Hamburg, 1 kg. 6 cks.
Rotterdam, 2 cs. 10 cks. 3 kgs.

**Manure—**
Antwerp, 150 bgs.
Hamburg, 643
Stettin, 229

**Naphtha—**
Hamburg, 1 brl.

**Pitch—**
Abo, 30 t.
Antwerp, 568

**Salt—**
Iceland, 161 t.

**Tar—**
Helsingfors, 150 t.

## TYNE.

*Week ending May 18th.*

**Alkali—**
Antwerp, 1 t. 3 c.
Hamburg, 5 6
Leghorn, 2 11
Naples, 1 0
Christiania, 5 9
Rotterdam, 1 11
Kalmar, 39 12

**Alum—**
Rouen 7 t. 14
Passages, 5 7

**Alum Cake—**
Genoa, 1 t. 14 c.

**Ammonia Carbonate—**
Copenhagen, 1 t.
Kalmar, 7 c.

**Ammonia Sulphate—**
Valencia, 75 t. 15 c.

**Antimony—**
New York, 10 t. 12 c.

**Arsenic—**
Leghorn, 1 t. 7 c.
Kalmar 1 19

**Bleaching Powder—**
Antwerp, 51 t. 10 c.
Terneuzen, 19 11
Gothenburg, 21 5
Hamburg, 26 12
Aarhuus, 6 2
Naples, 2 4
Christiania, 1 4
New York, 118 13
Passages, 93 19
Rotterdam, 2 10
Copenhagen 4 19
Newfairwater, 56 0

**Barium Carbonate—**
Rouen, 30 t.
New York, 100 10 c.

**Barium Nitrate—**
Rouen, 11½ c.

**Barium Chlorate—**
Rouen, 10 t. 5 c.

**Barytes—**
Rouen, 25 t.

**Caustic Soda—**
Antwerp, 4 t. 19 c.
Gothenburg, 51 2
New York, 135 5
Copenhagen 1 15

**Copper Sulphide—**
Landskrona, 16 c.

**Copperas—**
Drontheim, 1 t.
Oporto, 30 19 c.

**Litharge—**
Malmo 11 c.
Genoa, 11

**Litharge—***continued.*
Naples, 2 t. 4 c.
Palermo, 5
Christiania, 5½
Rouen, 9 t. 17
Oporto 1 13
Copenhagen, 2 13

**Manure—**
Odense, 5 t. 1 c.
**Kainit**
Aalborg, 1 t. 19 c.

**Magnesia—**
Rouen, 1 c.

**Potassium Chlorate—**
Gothenburg, 6 t.
Genoa, 10 c.
Leghorn, 10
Naples, 15
Palermo, 2

**Potassium Bichromate—**
Helsingborg, 7 c.

**Soda—**
Svendborg, 30 t. 19 c.
Antwerp, 5 7
Gothenburg, 14 3
Drontheim, 36 10
Aarhuus, 27 15
Aalborg, 53 3
Bandholm, 4 17
Esbjerg, 16 17
Odense, 10 13
New York, 266 9
Genoa, 22 3
Passages, 4 1
Leghorn, 24 15
Rotterdam, 17 3
Svendborg, 13 18
Kalmar, 32 1
Christiana, 10 18

**Soda Ash—**
Terneuzen, 10 t. 7 c.
Gothenburg, 20 16
Hamburg, 4 10
Genoa, 12 15
Leghorn, 2 12
Naples, 40 5
Newfairwater, 91 0
Drontheim, 2 8
Esbjerg 1 5
New York, 500 6
Copenhagen, 5 11
Kalmar, 25 3

**Sodium Bicarbonate—**
Genoa, 1 t.
Aalborg, 1
Esbjerg, 11 c
Newfairwater, 9 5

**Sodium Sulphate—**
Christiania, 5 t. 1 c.

**Sodium Nitrate—**
Aalborg, 3 c.

**Sodium Chlorate—**
Rotterdam, 1 t. 2 c.

**Salammoniac—**
Kalmar, 1 t. 5 c.

**Toluol—**
New York, 7 c.

## GOOLE.

*Week ending May 9th.*

**Alkali—**
Dunkirk, 24 cks.

**Benzol—**
Antwerp, 25 cks.
Rotterdam, 98

**Bleaching Powder—**
Ghent, 30 cks.

**Chemicals** *(otherwise undescribed)*
Boulogne, 10 tcs.
Calais, 40 cks.
Hamburg, 15
Rouen, 10

**Coal Products—**
Dunkirk, 26 cks.
Rotterdam, 110

**Glycerine—**
Rouen, 31 dms.

**Manure—**
Boulogne, 24 bgs
Ghent, 300

**Pitch—**
Antwerp, 272 t.

## GRIMSBY.

*Week ending May 12th.*

**Chemicals** *(otherwise undescribed)*
Antwerp, 3 cks. 7 dms.
Dieppe, 81 bottles.
Hamburg, 2 cs. 40 cks. 10 bottles.
Rotterdam, 35 dms.

**Coal Products—**
Dieppe, 9 cks.

# PRICES CURRENT. [THURSDAY, May 24, 1888.

PREPARED BY HIGGINBOTTOM AND Co., 116, PORTLAND STREET, MANCHESTER.

*The values stated are* F.O.R. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 8 | 9 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 12 | 10 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 3¾ |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3 |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (monohydrate) | ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6 |
| Arsenic, white powdered | per ton | 11 | 15 | 0 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 42 | 10 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 11 | 12 | 6 |
| ,, ,, (grey), Hull | ,, | 11 | 10 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8¼ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 5 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 11 | 10 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, | per unit | | | |
| Benzol, 90 % nominal ,, | per cwt. | 0 | 1 | 4 |
| ,, 50/90 ,, | per gallon | 0 | 2 | 10 |
| Carbolic Acid (crystallised 35°) | ,, | 0 | 2 | 4 |
| ,, (crude 60°) | per lb. | 0 | 1 | 2 |
| Creosote (ordinary) | per gallon | 0 | 3 | 11 |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 1½ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 0 | 2⅛ |
| Grease Oils, 22° Tw. | ,, | 0 | 1 | 0 |
| Pitch, f.o.b. Liverpool or Garston | per ton | 1 | 17 | 6 |
| Solvent Naphtha, 90 % at 160° | ,, | 0 | 11 | 0 |
| Coke-oven Oils (crude) | per gallon | 0 | 1 | 2 |
| Copper (Chili bars) | ,, | 0 | 0 | 1¾ |
| ,, Sulphate | per ton | 82 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 21 | 0 | 0 |
| Glycerine (crude) | ,, | 75 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 35 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 75 | 0 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 13 | 0 |
| ,, Sulphide (antimony slag) | ,, | 1 | 2 | 6 |
| Lead (sheet) for cash | ,, | 2 | 0 | 0 |
| ,, Litharge Flake (ex ship) | ,, | 13 | 10 | 0 |
| ,, Acetate (white, ,, ) | ,, | 15 | 0 | 0 |
| ,, ,, (brown, ,, ) | ,, | 25 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 20 | 15 | 0 |
| ,, Nitrate | ,, | 18 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 22 | 10 | 0 |
| ,, ,, (grey) | ,, | 8 | 5 | 0 |
| | ,, | 12 | 10 | 0 |

| | | £ | s. | d. |
|---|---|---|---|---|
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride | per ton | 2 | 7 | 6 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 17 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° O.P. | per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent | ,, | 0 | 3 | 10 |
| ,, ,, Miscible, 60° O.P. | ,, | 0 | 5 | 1½ |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 3 | 0 |
| Cotton-seed | per ton | 22 | 0 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 6 |
| ,, American | ,, | 0 | 0 | 6⅛ |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per cwt. | 0 | 16 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 5¾ |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 9 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 6¾ |
| ,, Sulphate, 90 % | per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % | ,, | 7 | 15 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 5⅜ |
| ,, Nitrate | ,, | 0 | 2 | 7⅛ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) | ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 19 | 10 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 30 | 0 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 5 | 0 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 11 | 3 |
| ,, Bicarbonate | ,, | 5 | 0 | 0 |
| ,, Hyposulphite | ,, | 5 | 10 | 0 |
| ,, Manganate, | ,, | 6 | 15 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 4½ |
| ,, Nitrite, 98% | per ton | 28 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5¾ |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 5 | 0 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 0 | 0 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 10 | 0 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 13 | 3 |
| ,, Cane | ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 7½ |
| ,, Barium | ,, | 0 | 0 | 5 |
| ,, Copper, 60% | ,, | 0 | 0 | 8 |
| Sulphur (Flowers) | per ton | 8 | 10 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 5 | 0 |
| Superphosphate of Lime (28 %) | ,, | 2 | 5 | 0 |
| Tallow | ,, | 26 | 0 | 0 |
| Tin (metal) | ,, | 85 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 6¾ |
| Zinc (Spelter) | per ton | 16 | 15 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 10 | 0 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, June 2, 1888.**


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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

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As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

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# NOTES ON THE MANUFACTURE OF CHLORINE, WITH SPECIAL REFERENCE TO THE USE OF MAGNESIA IN THAT PROCESS, AND ITS ECONOMY.

BY C. T. KINGZETT, F.I.C., F.C.S.*

IN course of the discussion which followed the communication to this Section by Professor James Dewar, the President of the Society, of his discourse on the Weldon-Pechiney process for the manufacture of chloride of magnesium, I pointed out that the chemical reactions involved in the process did not appear to have been satisfactorily determined. The oxychloride of magnesium as finally treated in that process contains more than 20 per cent. of water, and therefore it is possible that the chlorine which is obtained results not merely from the action of oxygen on the dry chloride or oxychloride, but also in part, and perhaps chiefly, from the oxidation of the vapour of hydrochloric acid which is necessarily generated in the earlier stages of the decomposition. I thought this matter worthy of remark, because if the chlorine results in any considerable proportion from the direct action of air upon the vapour of hydrochloric acid, then Leblanc soda makers would, as I pointed out, surely have an easy method of utilising their spare hydrochloric acid by means of a permanent quantity of magnesia to be alternately converted into chloride by hydrochloric acid, and decomposition of the product by air at a high temperature, indefinitely; or by the employment of a merely nominal amount of magnesia to effect the inter-action of air and hydrochloric acid vapour which might be passed in admixture in contact therewith. These modifications of the Weldon-Pechiney process would obviate the employment of chloride of magnesium as a substantial feature in the process—a matter which appears to be of much pecuniary importance, particularly to English manufacturers.

In his reply, Professor Dewar made no comment on the questions I had raised, and I therefore determined to test the matter for myself in my own laboratory. I have not been able to devote enough time, so far, to work out the subject to my perfect satisfaction, but the record of some of the experiments I have made will not be without interest and value to the members of this Society.

EXPERIMENT NO. 1.

The first experiment was conducted with the view of ascertaining if chlorine is produced by passing dry air mixed with HCl gas over pure dry magnesia. For this purpose a combustion tube was filled with a small quantity of MgO admixed with much asbestos, and connected with a flask in which hydrochloric acid gas was generated from a mixture of sulphuric acid and common salt, and through which a current of air was slowly passed, so that the mixture of air and hydrochloric acid gas, after being dried by passage through pure $H_2SO_4$, was transmitted over the contents of the combustion tube, which was maintained at a bright red heat for one hour. The gases which passed out from the tube were conducted through two Woulff's bottles, containing distilled water, which was subsequently examined for free chlorine and found to contain a total quantity of 0·5964 grm.

It should be mentioned that the gas had the characteristic odour of chlorine, and the quantity which was ascertained to be finally present in the water did not by any means represent the total quantity produced in the experiment, as by the passage of air, the chlorine was for the most part blown out of the solution, indeed, to such an extent that the gas above the water in both wash-bottles was distinctly green in colour.

The contents of the combustion tube, after the experiment, were rinsed out with distilled water, filtered, washed, and the solution acidified with nitric acid, after which the chlorine present therein was volumetrically determined. The chlorine which was found present, was equivalent to 2·584 grms. of $MgCl_2$. From the presence of combined chlorine in the contents of the combustion tube, it would appear to be possible that not only the following change had taken place—

$$2HCl + O = H_2O + Cl_2,$$

* A Paper read before the London Section of Soc. Chem. Ind., April 23, 1888.

but that the chlorine, in part, at least, resulted from the following reactions :—

$$MgO + 2HCl = MgCl_2 + H_2O, \text{ and}$$
$$MgCl_2 + O = MgO + Cl_2.$$

To elucidate this matter further, the next experiment was made.

EXPERIMENT NO. 2.

A mixture of dry HCl gas and air was passed through a combustion tube containing asbestos only, which was kept at a bright red heat, as before, for 1¾ hours, the gaseous product being passed through a mixture of 100 cc. of a 10 per cent. KI solution with 100 cc. of 1° : 5 $H_2SO_4$. Iodine was immediately liberated, indicating the presence of chlorine, and at the conclusion of the experiment the amount of chlorine, which had been formed was found to be 0·536 grm.; it is therefore evident that at this temperature, air decomposes HCl gas and furnishes chlorine in consequence, but that the quantity so obtained is much less than that which results when magnesia is employed as a catalytic agent.

The next experiment was made to ascertain if chlorine is obtained by the direct decomposition of anhydrous $MgCl_2$ by oxygen.

EXPERIMENT NO. 3.

About 13 grms. of pure MgO was ignited in a platinum crucible and afterwards admixed with about an equal quantity of previously ignited asbestos. The mixture was then placed in a combustion tube, which was heated for some time to remove all traces of moisture. Afterwards, a current of HCl gas, which was dried by passing it through two successive bottles of $H_2SO_4$, was passed over the mixture (at a dull red heat) in the combustion tube for one hour with the view of producing the chloride of magnesium. The current of HCl gas was then turned off, the tube was allowed to cool down to some extent, and a current of dry air was passed for a few moments through the tube in order to remove all traces of HCl gas or moisture; then the temperature was quickly raised to bright redness, and the current of air maintained during five hours, the gases being received in a successive series of tubes containing an acidified solution of potassic iodide.

The iodine liberated in the first receiver was equivalent to 0·9940 grm. chlorine, in the second receiver to 2·130 grms., and in the third receiver to 0·4960 grm., the total amount of chlorine thus produced being 3·6200 grms. After five hours no further chlorine was liberated.

The residue in the combustion tube was rinsed with distilled water into a beaker, in which it was thoroughly extracted, the successive quantities of supernatant liquid being filtered, and the washings and filtrate together examined for chlorine volumetrically. The amount found present was equal to 1·4725 grms. $MgCl_2$.

The experiments of which I have now given an account prove, therefore, that chlorine is obtained when a mixture of hydrochloric acid gas and air is exposed to a sufficiently high temperature, also that chlorine is formed by roasting pure dry chloride of magnesium in a current of air at a sufficiently high temperature, and that both these chemical changes are involved in passing a mixture of hydrochloric acid gas with air over magnesium chloride or magnesia at a suitable temperature.

The chemical reactions, therefore, that are concerned in the Weldon-Pechiney process, must be expressed as follows:—

(1) $H_2O + MgCl_2 = MgO + 2\,HCl$, and
$2\,HCl + O = H_2O + Cl_2$.
(2) $MgCl_2 + O = MgO + Cl_2$,

whilst the decomposition of the HCl vapour by means of air is, as I have shown, promoted by the presence of free magnesia.

So far then as the decomposition of hydrochloric acid vapour by air is concerned in the Weldon-Pechiney process, I think there can be no doubt that it resembles the so-called "Deacon" process of manufacturing chlorine, in which the decomposition is promoted by the presence of a third substance which also experiences chemical change.

As bearing upon the idea with which I started, namely, the possibility of using a constant and limited quantity of magnesia with a view of manufacturing chlorine from successive quantities of hydrochloric acid, the following further experiment was made:—

EXPERIMENT NO. 4.

Fifty cc. of fuming commercial HCl containing 18·980 rms. of real HCl (as ascertained by volumetric estimation) was placed in a flask which was so fitted that a current of air could be aspirated through the contents of the flask, which was kept at 70° C. The flask was further connected with a tube containing pumice-stone which had been impregnated with MgO by previously soaking the pumice-stone in a concentrated solution of $MgCl_2$, and then igniting it. The tube was kept at a bright red heat, as in the other experiments, and the gases passing out from the tube were conducted through a second tube (not heated, of course) containing lime, and subsequently through two wash-bottles containing acidified potassic iodide solution. Under these circumstances, the current of air and HCl vapour was maintained during six hours, and at the conclusion of the experiment, the chlorine absorbed by the lime, and the amount of iodine set free in the final wash-bottles, were respectively determined, as also the residual amount of HCl in the hydrochloric acid employed :—

| | Grms. |
|---|---|
| HCl at the commencement of experiment | 18·980 |
| Residual HCl at end of experiment ..... | 15·9687 |
| Used by difference ..... | 3·011 |

=2·929 grms. chlorine.

The contents of the lime tube were washed with water into a beaker, an excess of potassic iodide was added, and the whole was acidulated with dilute pure HCl; the amount of iodine thus set free was then determined, and found equal to 1·6028 grms. active Cl. The iodine set free in the acidified potassic iodide solutions was determined, and found equal to ·02982 grm. Cl in the first vessel, and ·02272 in the second vessel. Adding these quantities to the active chlorine present in the lime, we obtain a total of 1·65534 grms. active chlorine which resulted from the decomposition, in the process, of 2·929 grms. chlorine containing hydrochloric acid. It was also proved experimentally that chlorine was present in the form of $MgCl_2$ in the tube containing the pumice-stone, which had been coated with MgO. It thus seems to be tolerably well established that not only chlorine but that bleaching powder may be made directly, readily, and economically by passing a mixture of hydrochloric acid vapour and air, with or without aqueous vapour, over any suitable substance, such as brick or pumice-stone, which has been previously coated or admixed with MgO or a salt of magnesium; and to my mind this process presents great advantages over the so-called Weldon-Pechiney process, which involves the handling of huge quantities of solid material, and the employment of complicated and expensive plant.

In the practical manufacture of chlorine after the method which I have described, it would be possible to concentrate the gaseous product by passing it through successive chambers containing the porous material coated with the magnesium compound.

I may add that, personally, I was not aware, until Professor Dewar called attention in his paper to the statement of Graham, that chlorine could be obtained by roasting pure magnesium chloride in a current of air, and in the earlier experiments which I made for Mr. Weldon about 1870-72, in which we experimented with mixtures of the oxides of manganese and magnesia, I think we always regarded the active chlorine as having been derived from the decomposition of the chloride of manganese exclusively, the function of the magnesium compound consisted as we thought only in the regeneration of the oxide of magnesium. Other chemists, however, seem to have been more familiar with the true facts of the case, as is evidenced by a perusal of some specifications to which I will briefly direct attention.

From the specification by Henry Larkin and Wm. White, No. 3093 of 1870, for an invention which received provisional protection only, I quote as follows:—

"We obtain chlorine by the reaction of oxygen upon certain metallic chlorides at a high temperature. For this purpose we take any suitable chloride, such as the anhydrous chloride of magnesium or of iron, and spread it loosely over the floor of the furnace chamber or retort, in which it is brought to a red heat. In this state we expose it to the action of a current of oxygen or of dry atmospheric air; or we cause a fused chloride to fall or otherwise pass through a heated chamber containing oxygen. By thus exposing the heated chloride to the action of oxygen, a change of combination is brought about, the oxygen unites with the metallic base, while the combined chlorine is set free."

Evidently, therefore, these gentlemen were acquainted with the decomposition of magnesium chloride by oxygen, or assumed that such a decomposition takes place.

In the description of my experiments I have called attention to the fact that the inter-action of air and hydrochloric acid vapour is undoubtedly *assisted* by the presence of magnesia in the sense that a salt of copper acts in the Deacon process of manufacturing chlorine.

Mr. Joseph Townshend, in his specification No. 3483 of 1874, proposed to use a mixture of manganese chloride and magnesium chloride for saturating bricks or other suitable inert materials, which were then to be placed in any suitable heating chamber or vessel, and exposed to a current of hydrochloric acid and air. He fixes the temperature at which the decomposition is effected at between 200° and 300° Fahr., but preferred to use the higher temperature of about 600° Fahr.

It will be seen that none of these proposals are absolutely identical with the one which I have made, namely, the employment of any suitable porous substance coated or impregnated with magnesia or a salt of magnesium only for the purpose of assisting the decomposition of an indefinitely large amount of hydrochloric acid by the agency of a current of air in admixture. Of course, the employment of a porous substance may be dispensed with, and a fixed quantity of magnesia or other magnesium compounds be alone employed. The hydrochloric acid can be employed in the shape of vapour as generated in the manufacture of saltcake, or it may be obtained from a solution of the concentrated acid by evaporating it in a current of air or by allowing that liquid to enter the heated chamber containing the catalytic substance, in the form of drops or spray, thus securing also the presence of aqueous vapour, which, according to my experience, appears to materially promote the desired chemical change.

My process, therefore, may prove of special value in works where chlorine may be manufactured in the main by other methods, but in which hydrochloric acid is condensed and is available for utilisation otherwise.

In conclusion, I wish to add that I have taken steps to protect the novel features of the process I have herein briefly described.

## ZEAL WITHOUT KNOWLEDGE.

OUR old friend, the Major, came in the other morning with an extremely sad and far-away look upon his dignified and expressive countenance. It was that weary look that indicates a feeling of hopelessness regarding the subject matter of one's thought. We exclaimed: "Why, Major, what makes you look so doleful? What can be the matter?"

Our friend quietly seated himself, and waited a full minute before replying. Then he said: "I have been thinking of a man whose case has impressed me very deeply. He went into a jobbing business a few months ago and he is not doing well. He had a sufficient, though not a superfluous, capital, and he invested it very carefully. His purchases were made with discretion and sound judgment. He was familiar with the market, and knew just where to obtain the most desirable goods at the best figures. I have never seen a better selected stock of goods. His location is all right, and he is a good fellow to meet and do business with. He has two or three travellers out and they are strong men. They are doing fairly well, but that is all. As for business at the store, he is not doing anything. It is too bad!" And here the Major paused dejectedly.

"But," said we, "Does the gentleman advertise?" "No," said the Major, with emphasis, "and that is the whole difficulty. He has a good stock of goods and every inducement in the world, but nobody knows it. People who come here would be glad to call upon him but they don't know there is such a man in existence. His travellers may call on two, three, or even four hundred customers during the season, but what are they to the fifteen thousand men in this country who sell that line of goods? He should make every one of those dealers aware of his offerings and do it persistently. There is no other way to make his business pay. For the sake of economising a few hundred dollars he sits in his office day after day gnawing his moustache and brooding over the business that never comes. Of what use is the finest store, the most elegant stock, the most tempting bargains, or all the inducements that can be raked together if nobody knows about them? The fixed and universal laws of trade cannot be defied with impunity."—*American paper.*

## A FUEL OIL PIPE LINE.

IT is authoritatively reported that the Standard Oil Company has completed all its arrangements for building a pipe line from Lima, Ohio, to Chicago for the cheap and rapid transportation of the fuel oil, which is destined to take the place of coal in the great manufacturing establishments in Chicago. A short time ago the negotiations for the right of way along the line of the Chicago and Atlantic Railway were concluded, and since the first of last week every west-bound freight train on the road has contained from two to six cars of wrought-iron pipe. These cars have already been side-tracked as far West as Crown Point. Gangs of men are working westward from Lima and from Chicago distributing the pipe preparatory to digging along the north side of the track the trench in which it will be laid. Machinery will be used in the excavation of the trench, and as soon as all the pipe has been distributed the work of laying it in the ground will be conducted as fast as the weather will permit.

The pipe is eight inches in diameter, and each section is twenty-two feet long. To lay one mile requires 240 sections. As a carload contains only 48 sections, it requires fully five carloads for each mile, or about 1,050 loads for the whole line. The joints are similar to those used in gas and steam fitting, and will be equally tight. The total length of the pipe will be about 210 miles, and the entire line will be completed with as little delay as possible. This line will prove a boon to the manufacturing establishments of Chicago, who will soon be placed on a more favourable footing in their competition with manufacturers in other cities.—*Oil, Paint, and Drug Reporter.*

## NOTE ON THE SOLUBILITY OF MORPHINE AND ITS SALTS.

BY ALFRED H. ALLEN, PRESIDENT OF THE SOCIETY OF PUBLIC ANALYSTS.

ON page 247 of the *Chemical Trade Journal* there is a table by Dieterich, reprinted from the *Rep. d. Anal. Chem.*, showing the solubility of opium alkaloids in various liquids. Figures are only given in the case of morphine and narcotine, and some of them are so extraordinary that I have thought it desirable to repeat the experiments.

Thus, according to Dieterich, morphine is soluble in 7,000 parts of cold methyl alcohol, while requiring only 1,660 parts of ethyl alcohol for solution. The solubility in amyl alcohol is stated at 1 part in 1,300, and in acetic ether at 1 part in 1,665, while 1,250 parts of ordinary ether are stated to dissolve 1 part of morphine.

It follows from these statements that morphine is more soluble in ordinary ether than in acetic ether or amyl alcohol, which are solvents largely employed in preference to ether for extracting morphine from its solutions.

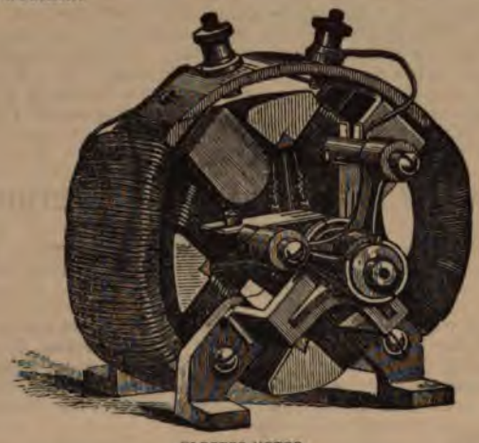
Similarly, there is a great difference between the solubility of morphine in methyl alcohol and its solubility in ethyl alcohol, so much so that it seemed probable that by substituting methyl alcohol for ethyl alcohol in the process of opium assay, originally recommended by Fluckiger and adopted in the German Pharmacopœa and by various other opium assayers, the error due to solubility of morphine might be materially diminished, with marked improvement in the accuracy of the process. Unfortunately, however, I find that morphine is very readily soluble in methyl alcohol, so much so that it would be hopeless to make the substitution I have suggested on the basis of Dieterich's results.

Dieterich also states that morphine sulphate is "very soluble" in ether. This is a very startling statement, for, if true, it would suggest that morphine was liable to be extracted by ether from aqueous solutions acidulated with sulphuric acid. This we know by experience not to be the case, but with a view of making the direct experiment I have tried the solubility of morphine sulphate in ordinary commercial ether. The experiment was made in the manner indicated by Dieterich. I find the solubility is one in 82,000, and when the ether has been previously washed free from traces of alcohol, and then dehydrated by means of potassium carbonate followed by distillation, the solubility of morphine sulphate is almost infinitesimal. Thus, the residue of morphine sulphate from 50 c.c. of dry ether free from alcohol was only 0·0002 gramme, corresponding to a solubility of 1 gramme of the salt in 162,000 grammes or 225,000 c.c.

## CHEMICAL ENGINEERING.*

III.

I MAY now say a few words in reference to the fitting up of a laboratory in which these so-called "technical experiments" should be performed. If it is in any way convenient I would certainly recommend the introduction of a steam pipe from the steam main supplying the works, so that if need be motive power could be obtained from it, or, steam could be employed for boiling, heating, or drying fairly large quantities of material much more economically and readily than could be managed by a naked flame. A small steam engine with a three-inch or four-inch cylinder and a six-inch stroke would serve for most of the purposes required. Motive power is certainly required in a laboratory of this kind, principally for mixing and stirring, and if steam is not at hand, a small gas-engine, say half or quarter man power, may easily be obtained now-a-days. Failing this there is the small water turbine that I have seen working very satisfactorily in several laboratories on the continent, it is simply connected to the ordinary water main, and is very useful in many operations. Lastly, in this connection, there is the electro-motor, which is illustrated in the accompanying woodcut.



ELECTRO-MOTOR.

One of the advantages of the electro-motor is its portability. It may be fixed temporarily to any part of the working bench and coupled up to the battery by means of flexible wires. The battery may be the ordinary bichromate type but excited with chromic acid, now easily obtainable at a moderate price, and in some instances in the larger towns, even the battery may be dispensed with, owing to the existence at a moderate price of secondary batteries and the facility with which they may be re-charged.

The weighing and measuring apparatus adopted in the laboratory seems not to call for special mention, though as much may be done by measurement alone, I would strongly advise the metric system—lineal measurements to be made in centimetres and cubical contents in cubic centimetres or litres, and in dealing with the composition of liquids the results should be expressed in grammes per litre. This will be found a very convenient method as it admits of easy conversion to the ordinary English system—grammes per litre is the equivalent of ounces per cubic foot, so that the one method of expression requires no conversion into the other. In all that follows in these lectures, the centigrade thermometric scale will be used and the barometrical measurements expressed in millimetres of mercury. Furthermore, the direct specific gravity of liquids will be indicated, compared with water as unity, as I hope to see at no very distant period the empirical scales of Twaddell and Beaumé supplanted by the only rational method. I believe that the introduction of the direct specific gravity instrument has been retarded by the instrument makers themselves in not providing a glass that can be easily read, they have always endeavoured to put too many graduations upon each instrument, instead of being satisfied with divisions representing 1° Tw. or a sp. gr. of 1·005. But in the laboratory, the Westphal balance is ere long destined to drive out the old specific gravity glasses, which latter will then be looked upon as incorrect and unreliable instruments.

Mills and mixers for powders and hard substances generally must now claim our attention, and the small mills made by Messrs. Brinjes and Goodwin deserve special attention. Messrs. W. H. Bailey and Co.'s special mortar and pestle for working by hand or power will also be found a very useful article for the technical laboratory. It is illustrated in the next figure. Very hard substances will have to be dealt with in an exceptional manner, and a pair of small hand rolls of chilled steel will perhaps be as convenient as anything I am able to describe.

BAILEY'S SPECIAL MORTAR.

In many alkali works a small hand coffee-mill is used for grinding up samples of soda-ash, and may of course find employment in many similar operations. After having been ground, sieving is nearly always necessary, and sieves of many patterns may easily be obtained of any dealer in such articles.

Another method of finely dividing and even mixing mineral substances is that of elutriation and levigation. C. Gerhardt, of Bonn, constructs two different apparatus of moderate size for this purpose. The first (A) where power is required to

(A).

drive the revolving brushes, shown in the illustration, and the second (B) wherein the motion of the particles results from the flow of water kept running through the apparatus. Either of these pieces of apparatus will be found very useful for the purposes of technical experiment, and a great many kilos. of material passed through them in a short space of time.

(B.)

When minerals or solid substances of any kind have been reduced to the finest possible state of division and have to be mixed thoroughly, hand-mixing is a most laborious task and extremely unsatisfactory. In order to get some idea of the efficiency of hand-

* A course of lectures delivered by Mr. George E. Davis at the Manchester Technical School.—*All rights reserved.*

mixing, I once gave one of my pupils a kilogramme of finely powdered peroxide of manganese and a kilo. of common salt to be mixed together, when it was found that only after half an hour's mixing with a spatula could homogeneous samples be drawn from the mass. This is not the case, however, with machine mixing; a few seconds will often completely mix such a quantity if the mixer is one of good pattern. What is called the "Niagara" mixer in the States is for dry powders one of the best I have ever met with, and the "Desideratum" mixer, made by Messrs. Bracher, of Wincanton, is none the less effective. Either of these mixers would find many uses in carrying out the technical experiments I have already described, such as the action of sulphuric acid upon phosphate of lime, or the thorough admixture of the phosphate of alumina with soda ash and sand. For such special purposes as the washing of crude naphtha with sulphuric acid, a mixer of quite another pattern is most advantageous to use, but as the "Niagara" mixer will effect this nearly as well in the laboratory, I will refer to other apparatus in another lecture.

We may now turn our attention to another operation or series of operations in which the application of heat is necessary. Many will think that furnaces would be bulky and inconvenient appliances to have in a laboratory, but this is not so; as early as 1872 I had three very good furnaces in a laboratory where small-scale experiments could be carried on, and now, when gas-heating has been so wonderfully developed, a small furnace or two should present no difficulties. For small experiments, even up to the melting of kilos. of cast iron, Fletcher's small blast furnace, shown in the accompanying illustration, may be very advantageously

FLETCHER'S TABLE BLAST FURNACE.

employed. When a small-power blower is at hand, one of Mr. Fletcher's loose burners may be supplied to a small furnace, whether employed for melting metals, refining, roasting, or calcining ores, and the power of such a furnace is extraordinary, quite beyond the belief of anyone who has not worked with gas as a fuel before. It should be remembered that, roughly, a thousand cubic feet of coal-gas weighs about 16 kilos. or 35 lb., and a kilo. of coal-gas properly consumed will do the work of two kilos. of coal. This will enable us to calculate easily the quantity of gas required to replace coal in experimental furnaces. About one hundred cubic feet per hour will be quite sufficient to heat a laboratory furnace of considerable size. The burner to be used with a a blast of air is shown in the accompanying illustration.

FLETCHER'S BURNER JET.

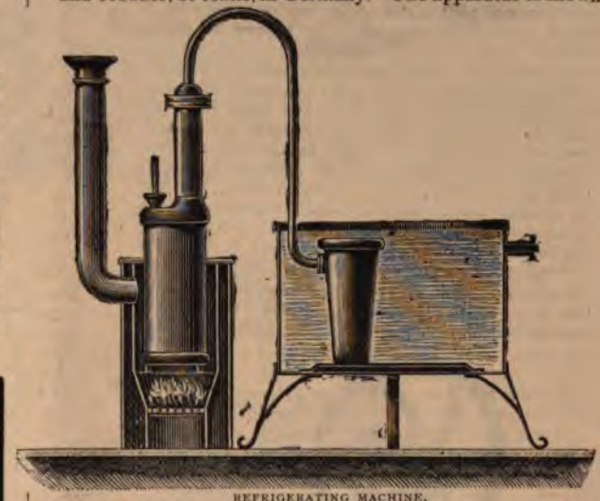
If built-up furnaces are considered too large, we can fall back to Fletcher's fire-clay reverberatory furnace, which is heated by a special burner, the products of combustion being carried away by an ordinary chimney, such as is shown by the

FLETCHER'S REVERBERATORY FURNACE.

annexed figure. In this furnace moderately large quantities of metal may readily be melted, and even nickel of as much as four or five pounds at a time can be dealt with. For ordinary fusions there is little room for improvement with this furnace, which is compact, taking up but little room, and requires but a small blower to work it satisfactorily.

Griffin, of London, has made some very good furnaces which I have used very successfully; they are substantially built, and will stand a deal of rough usage. On the whole, furnacing operations may be carried on in the laboratory, of any magnitude, and if a supply of coal-gas is not obtainable, the very cheap and easily managed "Dowson" gas may be in the hands of anyone. Gas furnacing is so clean, so convenient, and so easily regulated, that the school for learning its applications should be the technical laboratory.

The operation of cooling and its results has not been sufficiently studied in connection with the chemical industries, mainly on account of the large cost of refrigerating machines; but there are small portable refrigerators to be obtained on the absorption principle, capable of producing several kilos. of ice in a short space of time and without any trouble. One of these small apparatus is shown in the accompanying illustration, and is made by Messrs. Wegelin and Hübner, of Halle, in Germany. The apparatus is shown



REFRIGERATING MACHINE.

heated by a charcoal fire, but it will readily be seen that gas heating would be more satisfactory and under control. The cost of a machine for making four kilos. of ice per operation, or cooling seven litres of water to 0° C. such as is illustrated, with welded joints, is about £20, delivered in England. With this apparatus the action of cold on certain solutions may be very readily studied in the laboratory. Later on I shall devote a special lecture to the subject of refrigeration on the large scale.

Exhausting, compressing, and moving gases may readily be effected in the laboratory supplied with power; but even without power in the form of a special engine, these operations may be performed by means of steam-jet exhausters or compressors, or even by the water-jet connected with the town's water supply. The use of these appliances in special cases will be fully treated of in a subsequent lecture; still it

may happen that they would be just as useful in the laboratory as when employed in the works.

FILTER PRESS.

specially for use in the laboratory by Messrs. W. H. Bailey and Co., may be seen in the accompanying illustration. There is another appliance I would like to bring before your notice in this connection, and that is the hydro-extractor or centrifugal dryer, such as is made by Messrs. Manlove, Alliott, and Co., of Nottingham. In Germany very small ones indeed are made strictly for laboratory use, as that made by C. Gerhardt, in Bonn, and illustrated here will show, and small ones are also made by the English firm already mentioned, but not we believe so small as the one figured. The hydro-extractor is not so universally applicable as the filter press or vacuum filter, but has its special uses, which are the separation of the mother liquor from crystals, and similar operations where the solid matter does not break down under the influence of the centrifugal pressure. In the extraction of oil from seeds small hydraulic presses can now be obtained from several makers at a reasonable rate, so that the large scale operations may be exactly followed in the laboratory on a few kilogrammes of the substance. Gerhardt also makes a special tincture or decoction press, which will yield a pressure of 50 kilos. per square centimetre, and of a capacity of from 1 to 12 litres. This will be found very handy for those working in natural dyestuffs and similar materials. It is shown in the annexed illustration.

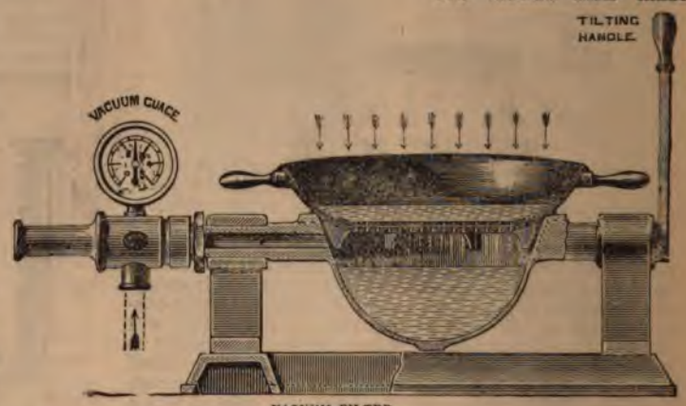
*HYDRO-EXTRACTOR.*

There is also another important operation which should find many applications in the laboratory, and that is the use and recovery of expensive solvents employed for dissolving certain constituents from solid substances, such as the oils from seeds and the treatment of the residues from the manufacture of stearine and paraffin. High priced solvents are also largely used abroad for the extraction of artificial colouring matters, alkaloids, etc., with such substances

In performing an experiment in which several kilogrammes of materials are employed, special means must be adopted for separating soluble from insoluble substances, the ordinary funnel and filter paper is too inconvenient for even moderate quantities of substance, and in Germany small filter presses, such as are shown by the next woodcut, are made for laboratory use. They are produced in several forms, the one illustrated being perhaps the most handy. It is made by Wegelin and Hübner, with a filtering surface of 800 square centimetres and a liquor vessel of 16 litres capacity for £18 sterling. Press frames 10, 20, 30 mm. in thickness are also supplied with the machine, as it is a well known fact that the thickness of the cakes has a great influence on the successful working. A contrivance is also added for the purpose of washing or extracting the crude precipitate.

Vacuum filters are also largely employed in chemical operations, and may with advantage be employed in laboratory operations also. They are exceedingly useful, and for "technical experiments" perhaps are more universally applicable than filter presses, they certainly are less costly.

The vacuum filter made




VACUUM FILTER.

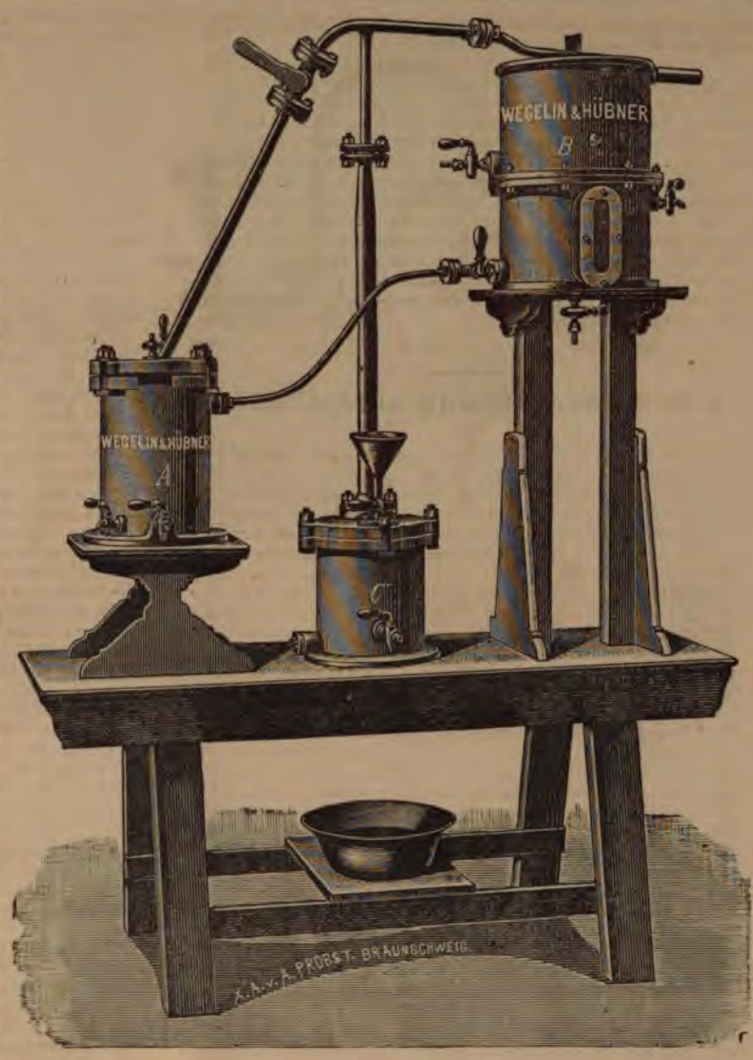
TINCTURE OR DECOCTION PRESS.

as benzine, bisulphide of carbon, sulphuric ether, alcohol and acetone, and the commercial success of these processes is entirely due to the excellence of the apparatus used in these various processes, whereby the loss of solvent is reduced to a very infinitesimal amount. Laboratory apparatus of a size suitable for our technical experiments has been made for a number of years for extracting with these solvents by Messrs. Wegelin and Hübner, of a capacity varying from 6 to 30 litres, an illustration of which is annexed.

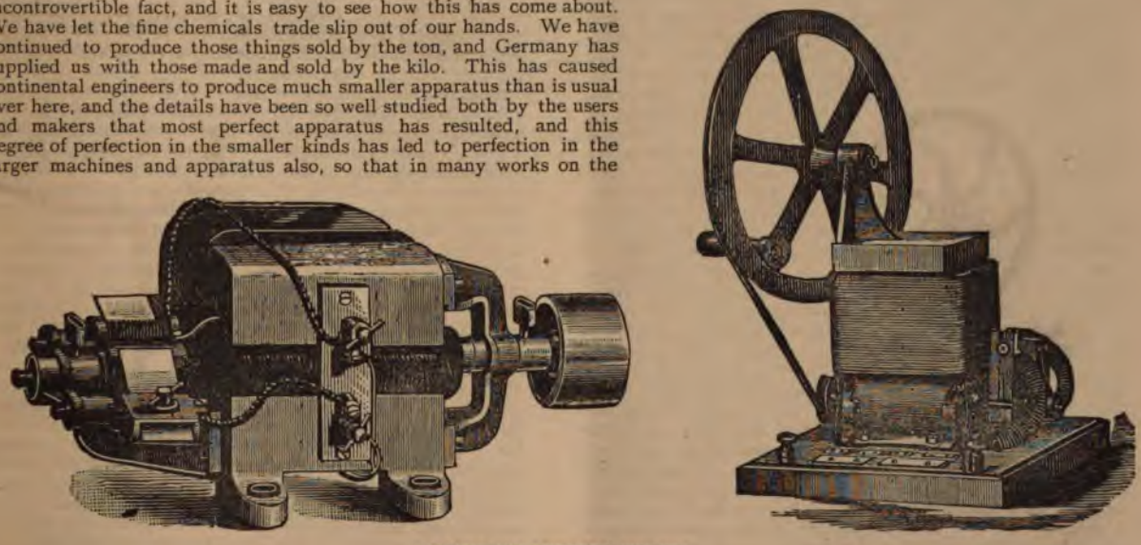
The substance from which it is desired to extract some constituent by means of a volatile solvent is placed in the extractor *A*, and after completion of the operation the remainder of the solvent is driven off by heat, and the vapours become condensed in the upper portion of *B*, so that the residue in the extractor does not carry away with it any notable quantity of the solvent employed; the solution is now placed in the still *C*, where the main portion of the solvent is driven off and condensed in *B*, the substance extracted being retained in the still *C*.

The operations of dialysis and electrolysis seem to be coming to the front as manufacturing operations. A neat dialyser for technical experiments is now made by Messrs. Dehne, of Halle, and this may well find its way into experimental laboratories. In electrolysis there are hosts of dynamos to select from, but for a laboratory and for purely experimental purposes, Messrs. Cuttriss' "students' dynamo," with shunt and series switch, giving ordinarily a current of 5 ampères and 13 volts intensity will be found sufficient. Their "Eclipse" dynamo, yielding 14 ampères with a current intensity of 40 volts, would suit admirably for larger experiments. It is figured in the next illustration.

The operations of evaporation and distillation have been well cared for in the apparatus Lagers, of the continent; small stills as complete in their arrangements as those working on the large scale may now be obtained at small cost; there is certainly nothing to be obtained at an equal price in England. In saying this I have no desire to unduly enhance the wares of foreigners in the eyes of the Englishman, but what has been stated is an incontrovertible fact, and it is easy to see how this has come about. We have let the fine chemicals trade slip out of our hands. We have continued to produce those things sold by the ton, and Germany has supplied us with those made and sold by the kilo. This has caused continental engineers to produce much smaller apparatus than is usual over here, and the details have been so well studied both by the users and makers that most perfect apparatus has resulted, and this degree of perfection in the smaller kinds has led to perfection in the larger machines and apparatus also, so that in many works on the




RECOVERY APPARATUS.



ECLIPSE AND STUDENTS' DYNAMOS.

continent the ordinary manufacture is carried on with the precision of laboratory experiments.

As to competition with the German makers in the construction of apparatus for technical experiments, I fear it is out of the question. Their low prices result from the large number made simultaneously, and the cost of patterns and superintendence have now most assuredly been written off; but there is no reason why we should not compete successfully in large-scale apparatus, provided we go about the work in a proper manner and with due regard to the scientific bearings of the problems which have to be solved. Unfortunately it is only in a few industries that the construction of plant has been carried out in a truly scientific manner, and I argue that the best way to study what is actually required is by carrying out a technical experiment on a few kilos. of substance in the technical laboratory.

*(To be continued.)*

## A NEW DEPARTURE IN METALLURGY.

AN enterprise which, if it does not belie the hope of its promoters, may prove to be the basis of a large industry, is on the point of being started at Oldbury—a town in which new employment for labour is especially acceptable. The Aluminium Company Limited, which has been formed for the purpose of turning to commercial advantage some discoveries made in metallurgy by Mr. H. Y. Castner, a young American scientist, has built works there, and is about to begin the manufacture of aluminium by a new process. Aluminium is at the same time one of the most useful and one of the costliest of metals. The *St. James's Gazette*, in an article with reference to it published a few days ago, went so far as to suggest that just as the present century is an age of iron and steel, so the twentieth may be an age of aluminium. That is a prediction not quite warranted by what is known of the metal, and particularly of the natural difficulty of procuring it from its bases; but aluminium possesses properties which, if those difficulties could be cheaply overcome, would almost entirely cause it to supersede both iron and steel for a variety of purposes, and to supplement them for most others. Pure aluminium is three times as light as forged steel, and can be beaten into impalpable leaves, or spun into hair-like wire, as gold is; yet it has withal a tensile strength equal to steel. It tarnishes, but it is not eaten away by rust, for the tarnish seems to form a protecting film upon it. Yet when small quantities of it are added to steel, it is said to increase the resistance of that metal to oxidation, and at the same time to greatly increase its tensile strength. Alloyed with brass in the proportion of 10 parts to 100 it improves alike the tensile strength, the colour, and the durability of that metal; mixed with copper in the same proportions, it yields an alloy which, with a density 20 per cent. lower than that of the quality of steel which is used for heavy ordnance, has a tensile strength 30 per cent. greater. In combination with either steel or copper it has the further merit of so increasing their fluidity under heat that they make sounder castings; and to produce this result a surprisingly small admixture is needed—one part, it is found, to a thousand of Siemens-Martin steel. In respect, indeed, of its singularly powerful effects in changing the properties of other metals, it more nearly resembles the fabled Philosopher's Stone than does any element yet discovered by modern science; and, strange to say, one of its alloys with copper gives a colour so very like to that of gold that only an expert can detect the difference. It is, moreover, one of the most abundant elements in nature. Common clay is a hydrated silicate of the metal; cryolite, a mineral found in large quantities in Greenland, is a double fluoride of aluminium and sodium; and other earths, without number, contain the precious ore in a plenitude exceeded only in the case of silicon. There is little wonder that the late Emperor of the French was fascinated with the prospect of its extended use, or that he made grants amounting to £1,500 to M. Henri Saint Claire Deville for experiments which resulted only in the fabrication of two bars of it. These were used, by the bye, in casting "French eagles" for the army, and the experiments ceased with that. Since then many attempts have been made to do away with the paradox that aluminium was at once a common and a costly metal. Deville's process, in a cheapened form, is in use in France and Germany; and in what is called the Cowles process electricity is used with good effect for producing alloys. But the market price of commercial aluminium has been about 35s. per lb., and of pure aluminium the price is as high as 50s. While such prices continue to hold, the uses of the metal must be very limited; and the field of its usefulness is smaller than it would otherwise be because there is a marked difference between the "commercial" quality and that which is termed pure. The former cannot be freed from 5 per cent. of iron and silicon by any known treatment; the latter, which is so much more expensively produced, contains only 2 per cent. After what has been said of the effect of one part of aluminium in 1,000 upon steel, it will not seem strange that abstracting 3 per cent. of iron and silicon changes the properties of aluminium very strongly. The "pure" metal can be rolled and drawn, even to the extraordinary extent adverted to above; the commercial metal is insusceptible of such treatment. The difference is analagous to that which obtains between wrought and cast-iron.

The Aluminium Company proposes to make the pure metal to sell at a much lower price than is asked for the commercial kind. Its directors include Sir Henry E. Roscoe, M.P., Lieutenant-General Sir Andrew Clarke, and other gentlemen whose knowledge of metallurgy fits them to judge of the probable success of the undertaking. It owes its formation to Mr. Castner, whose cheapened process of separating sodium and potassium, is essential to the economic manufacture of aluminium. Mr. Castner, with his partners, the Booth Brothers, of New York, is understood to have spent £20,000 in perfecting the inventions. Briefly described, his process consists of three stages. In the first two sodium and chloride of aluminium are obtained; in the third these are fused, and aluminium is the resultant, with common salt as a residual product. At the Oldbury works there are twenty sodium furnaces, sixty retorts for the production of the chloride, and one small furnace for the final stage of the process, together with a varied mechanical plant. The chloride of aluminium is prepared by passing chlorine over an alumina mixture, in a heated retort, after a fashion which operates much more speedily, and consequently effects a greater economy in fuel than the method commonly practised. A saving of 50 per cent. in cost of the chloride is thus effected. Sodium, by Mr. Castner's process, is derived from the hydrate by means of a combination of iron and carbon heated with it in a retort to a temperature of about 850 degrees Centigrade, at which the sodium distils. By the old process carbon only was used, and a temperature of 1,400 degrees was requisite to effect the distillation, the result being that there was not only an excessive consumption of fuel, but a considerable wear and tear of the retorts. Whereas the market price of sodium is 6s. per lb., Mr. Castner's price lists offer it at 2s. to 2s. 6d. It is here that the greatest saving in the manufacture of aluminium is made. Whereas 20s. worth of sodium is said to be ordinarily used to separate 1lb. of pure aluminium from the chloride, the new company will use only 3s. 6d. worth. The plant includes also a Weldon apparatus for the preparation of chlorine—acid being obtained through a pipe from the adjoining works of Messrs. Chance Brothers—an apparatus for testing in various ways the strength of metals, and a chemical laboratory. Fully employed, the new works will turn out between 300lb. and 400lb. of aluminium per diem, a quantity estimated to be more than three times greater than the present output of the whole world. They will furnish labour for 125 men. It is evident, therefore, that adequate measures have been taken to put to the test of practice a discovery which promises much, and which cannot fail to have a sensible bearing upon the future of industrial metallurgy. It would not be easy to enumerate the uses to which, if the company's expectations be realised, aluminium may be conceivably be put. In its unalloyed form its lightness will commend it to aëronauts, to bicyclists, to the makers of delicate scientific apparatus, and to military ornament makers; while the inert and harmless nature of its oxide makes it valuable to surgeons. It will be remembered that an aluminium cannula has lately been substituted with good effect for a silver one in the case of the German Emperor. Aluminium bronze has been spoken of by certain authorities on military matters as the best alloy available for gun-castings. The extraordinary strength of the "mitis" castings introduced by Mr. Nordenfeldt is, indeed, attributed to the use of a little aluminium in the forging; and in Russia and the United States some guns have been made of similar metal with excellent results. Lastly, our own War Office is making formal inquiries as to the serviceability of the metal. In the arts of peace it will find a multiplicity of uses if it be made cheap enough, for, in view of what was said above, it will be understood that there are few cases, except when

weight in apparatus or machinery is desired, in which it might not be used with advantage. Much is to be said for it as an element in the alloys of which machine-bearings are cast. Table cutlery of a good lustre is obtained by adding it in a minute proportion to German silver, and such cutlery will take an edge as keen as that of a steel blade. When an alloy of aluminium and brass has been prepared a wire may be drawn from it, which, with half the thickness of common brass wire, will have the same strength. Since it is a fine conductor of electricity, we may see it largely used in telegraph wires, but no alloy of aluminium is yet known which would be flexible enough to compete with phosphor bronze as a material for telephone wires. Other possible uses to which it may be applied, from the sphere of marine engineering to that of harness-making, might be indicated; but sufficient has been said to show that the new undertaking is of real interest and potential importance.—*Birmingham Daily Post*.

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

B. C.—The firm is no longer in existence; the works have been closed and demolished some years since.

D. D.—The works are doing but very little; you should inquire through the Manchester Guardian Society.

Chemist.—We are sorry to refuse your letter, but it is too strong, though perfectly true.

H. J.—Lockwood and Co. were the publishers.

Distiller.—The old-fashioned boiler stills are doomed to die out; the new ones are far more economical.

Tar.—We are of the same opinion still. If, however, circumstances arise which alter our opinions, we shall certainly let our readers know.

Assistant.—Advertise your requirements. No doubt you will receive plenty of applications.

Colour.—We are rather sceptical as to the value of the process ourselves, but we are waiting to see what time will bring.

Bleacher.—See letters in this week's number.

H.—We are pleased to hear you speak so approvingly of our efforts. All suggestions receive our best attention.

Student.—The lectures cannot appear in book form for some months yet. You will see the labour is very great.

## BLEACHING BY ELECTRICITY.

*To the Editor of the Chemical Trade Journal.*

Sir,—The interesting article on the above subject in your issue of 5th May calls attention to the Hermite process, and to the three papers relating to it that have been read before the Society of Chemical Industry by Messrs. Cross and Bevan and by Dr. Hurter. Now, whilst I have no desire to attack the Hermite process, nor to defend Dr. Hurter, I would like to call attention to the inconsistencies in the statements made in their two papers by Messrs. Cross and Bevan.

(1) In their paper of March, 1887, they claim that the amount of available chlorine formed is in excess of that calculated on the basis of the electrolytic law as directly interpreted, and to bear out this claim they give the results of an experiment extending over twelve hours, and divided into four periods of three hours each.

| | | | | | |
|---|---|---|---|---|---|
| 1st period | 134·3 | parts available Cl. were formed against | 100 | required by theory. |
| 2nd ,, | 83·5 | ,, | 100 | ,, |
| 3rd ,, | 116·3 | ,, | 100 | ,, |
| 4th ,, | 104·4 | ,, | 100 | ,, |
| Mean | 109·4 | ,, | 100 | ,, |

and they say that similar results have been "so repeatedly verified that we give them as inherently associated with the electrolysis." But in their paper of April, 1888, they abandon this claim of yield so largely in excess of the theoretical—amounting in one case to 34·3 per cent. in excess of theory, and on an average 9·4 per cent. in excess—and claim a yield of (with 2·5 per cent. Mg $Cl_2$ solution) only 72·8 per cent. of the theoretical—

72·8 : 134·3 :: 100 : 184
and 72·8 : 109·4 :: 100 : 150

Such large experimental errors suggest that whilst there can be little doubt as to the inaccuracy of the earlier figures, it is by no means so certain that the later ones are correct.

(2) They stated in their original paper that hydrogen peroxide is present in the electrolised solution, but—their attention having been called to the point—they now admit that they were in error, and say "it was a careless mistake on our part."

(3) In their earlier paper they give the production of "hypothetical bleaching powder" as 10 cwt. per 344,000 Watts, or 1lb. of "hypothetical bleaching powder" per 307 Watts. In their later estimate they give the output of "hypothetical bleaching powder" (notwithstanding their abandonment of the high "current efficiency" claim as 175lb. per 40,425 Watts, or 1lb. per 231 Watts. The E.M.F. is the same in each case.

(4) The loss of magnesium chloride is given in their first paper as 1 per cent. on the "hypothetical bleaching powder" (this with wood pulp bleaching). At £5 per ton anhydrous magnesium chloride this comes to 1s. per ton hypothetical bleaching powder; but in their last estimate of the cost of bleaching linen yarn the loss of magnesium chloride constitutes a debit of 10s. 5d. per ton hypothetical bleaching powder.

(5) In March, 1887, experiments were quoted showing the maximum bleaching efficiency of the electrolised solution (with flax yarn) to be twice that of ordinary bleaching powder; with green yarn the proportion given was 1·9 to 1; with paper pulp 1·8 to 1. Their estimate of cost was based on a relative efficiency of 5 to 3. In April, 1888, they claim "greater bleaching efficiency of the electrolytic chlorine, involving an expenditure of about one-half the quantity necessary when employed in the form of bleaching powder." In other words, they still assert the relative efficiency to be 2 to 1. But anyone who cares to go into the details (and taking the current efficiency at their own figure of 72·8 per cent.) will find that their estimate in connection with the Belfast experiments represents an efficiency of 3·0 to 1.

(6) The cost per annum (7,200 hours) of one horse-power steam was taken in their first paper at £9; but in their latest estimate they take it at £15 (½d. per hour).

(7) In their last paper they say: "Subsequent experience has substantially confirmed the estimate of cost originally propounded." So far from this being the case *not a single figure of their original estimate is retained*, everyone having been subjected to *radical* modification, as will be seen from the following tabulated statement:—

| | Original estimate. | New estimate. |
|---|---|---|
| Yield (current efficiency) | 109·4 | 72·8 |
| Watts per lb. B.P. | 307 | 231 |
| Loss of Mg $Cl_2$, shillings per ton B.P. | 1/0 | 10/5 |
| Bleaching efficiency | 1·66 to 1 | 3·3 to 1 |
| Annual cost per H.P. | £9 | £15 |
| H.P. for one hour per ton B.P. | 1,200 | 864 |
| Interest and depreciation per ton B.P. | £1 | 13/4 |

As I said before, I have no intention to discuss the merits of the Hermite process itself; but I think I have said enough to convince every practical mind that the statements made respecting it by Messrs. Cross and Bevan are altogether conflicting, and therefore untrustworthy and not to be relied upon.—Yours, etc.

Newcastle-on-Tyne, 19th May, 1888. W. M.

*To the Editor of the Chemical Trade Journal.*

Sir,—Returned from the continent a few days since, I have had little time to devote to Messrs. Cross and Bevan's paper on the Hermite process. I shall, of course, reply to it fully as soon as possible.

Your leading article on the subject shows that you, as usual, attach no great value to the mere theoretical aspect, but lay much more stress upon the experimental evidence obtained at Belfast, as of course all practical men will do.

It has struck me, however, that you have not perhaps had the time to weigh the evidence afforded by the Belfast experiment very carefully, and have accepted as facts the figures supplied by Messrs. Cross and Bevan. In that experiment, 8,091 ampère-hours produced 8·62 kilos. of chlorine as calculated by means of ordinary electro-chemical equivalents, and on the assumption of the very high current efficiency of 80 per cent.

These 8·62 kilos. of chlorine, we are told, did the same amount of bleaching as 28 kilos. of chlorine contained in 175 lb. (English) bleach, and the 8·62 kilos. of chlorine were obtained at a cost of 4s. 8d.

The outcome of this experiment is this: To produce as much chlorine by electrolysis as is contained in one ton of bleach would cost £9. 15s., the cost being made up of the following items:—

| | £ | s. | d. |
|---|---|---|---|
| (1) Power calculated, not measured ..... | 5 | 17 | 6 |
| (2) Magnesium chloride ..... | 1 | 14 | 0 |
| (3) Interest and depreciation, estimated ... | 2 | 3 | 6 |
| | £9 | 15 | 0 |

You will therefore perceive that this evidence is of a very doubtful character, as nearly three-fourths of the whole cost are only estimates. The chlorine, even on this estimate, is much dearer than bleaching powder; it is only when the very mysterious bleaching power of this electrolytic chlorine (now admitted to be chiefly in form of hypochlorites) is taken into account that any saving can be made out. From the present figures we are expected to believe that the bleaching efficiency is about three times as great as that of ordinary chlorine.

Is it not wonderful that as the current efficiency has, owing to my criticisms, been reduced from 134 per cent. to 72 per cent., the bleaching efficiency of the chlorine very obligingly went up from 166 per cent. to 333 per cent.?

I am very glad to see that you have decided to give us the benefit of your lectures on chemical engineering in your valuable journal; whenever you publish them in book form put me down as one of your subscribers.—Yours, etc.,

Widnes, 19th May, 1888. Ferd. Hurter.

# Obituary.

### WILLIAM KEATES.

THE death is announced of Mr. William Keates, in his eighty-eighth year, at Leamington, on Friday, the 18th ult. The deceased formerly resided at Old Ravenhead Hall. Mr. Keates sprang from an old family of Staffordshire yeomen, and received some training under Faraday. In his early years he was engaged at the Cheadle Brass Works, and he became one of the leading copper smelters in England. On leaving Cheadle he took charge of some copper works at Lougher (Swansea). In later years he fixed on Old Ravenhead as the most favourable site for carrying on the business he was engaged in. It is about sixty years since he built these works, which afterwards passed into the hands of Messrs. S. Bibby and Son, and are now worked by the St. Helens Copper Co. In the year 1833 Mr. Keates built the Sutton Copper Works on the line of railway to Widnes, and for half a century the business has been conducted under the style of Newton, Keates and Co. The copper that was smelted at St. Helens by Mr. Keates was sent to Holywell to be rolled. He resided at Greenfield Hall, and personally managed the works. The firm later on extended its operations to lead and silver smelting. In 1855 the Parr Copper Works were built, and were regarded as model works of the kind. They afterwards passed into the possession of the late Mr. Henry Baxter, and in 1859 and 1860 the new Rolling Mills at Sutton Moss were erected. Notwithstanding the heavy weight of business pressing on Mr. Keates' shoulders, he discharged faithfully his duties as a magistrate in Flint, and was at one time High Sheriff of the county. After Mr. Keates removed to the Pickhill Hall estate, near Wrexham, his elder son died. The estate was then sold, the Bagillt Lead Works closed, and the lead and silver business was wound-up. The remaining portions of the business were left to the care of the surviving son, Mr. J. A. Keates. For a short time Mr. Keates was a director of the Alliance Bank, and had an interest in the Runcorn Soap and Alkali Company. He was a Conservative in politics, and a member of the Church of England. He was one of the fathers of St. Helens, and it is owing in no small degree to his industry that the town occupies a foremost place amongst the industrial centres of the world.

### LUDWIG NOBEL.

THE engineering profession has suffered a severe loss in the death of Mr. Ludwig Nobel, at Cannes. The son of a Swedish engineer, who invented and placed in the channels of Cronstadt the "infernal machines" which annoyed Sir Charles Napier so much, he received a practical training as engineer, and notwithstanding a temporary check experienced by the failure of his father; he managed by hard work and economy to recover in time the ironworks his father had lost, and extended them to their present proportions at St. Petersburg. But it was less in his own profession than outside it that he was destined to achieve distinction, although it was his engineering capacity that equipped him for the revolution he accomplished in the oil trade. In this respect his career was a striking illustration of the influence a modern engineer can exercise upon a purely commercial pursuit. Quite by chance, in 1876, he was led by his brother, whom he had sent to the Caucasus in search of walnut wood for the stocks of the Berdan rifles he was manufacturing for the government, to invest a few thousands in a small Baku oil refinery. This failing to yield much profit, owing to the difficulties of transport, Mr. Ludwig Nobel applied himself seriously to solve some of them, and by degrees was drawn completely into the petroleum business. The innovations he introduced, in the shape of pipe lines, tank steamers, and tank cars for railways, not only in a few short years revolutionised the oil trade of Russia, but that of the whole of Europe; the elaborate system of transport in bulk he established, coupled with the copious supply of cheap oil, enabling Russian petroleum to penetrate to every town on the continent, and even flood the more distant market of India. The enormous magnitude to which his undertaking rapidly expanded, until the few thousands he embarked in the business developed to a capital of three millions sterling, was told three years ago by Mr. Charles Marvin, whose "Petroleum Industry of Russia" contained in all engineering essentials the story of the Baku oil king's extraordinary career.

To-day the Nobel firm owns the largest oil refinery in the world, the largest fleet of tank steamers, thousands of oil trucks, and depots holding tens of millions of gallons of oil. That so much should have been achieved in a little more than ten years is a remarkable testimony to the power of organisation Ludwig Nobel possessed to an eminent degree, while the wealth he amassed in a pursuit wherein merchants had either failed or made but a miserable income shows what may be achieved by the enterprising and skilled engineer in the departments of trade conventionally supposed to belong to merchants only.—*Engineering*.

## THE PARR ALKALI WORKS.

WE understand that the Parr Alkali Works, whose promising career ran so narrow a risk of being nipped in the early bud by the recent proceedings in the matter of Messrs. Lockwood and Leith, will probably be purchased from the trustee in bankruptcy by a syndicate, whose object is at once to form a company, complete the works, and take up the manufacture of bleaching powder. It will be a source of much satisfaction to many that this new centre of industry, which is so well situated and will be fully equipped, and which will find employment for upwards of 400 persons, is not likely to be doomed much longer to silence. The establishment of new works, or the revival of old ones by the addition of the most recent appliances and conveniences, is of the greatest possible interest and importance to this district, especially when the article manufactured is one for which an increasing demand is assured by the necessities of other manufactures to which it is contributory. We learn also that Mr. John Leith will receive the appointment of manager of the new concern. The only stumbling-block that prevents the completion of the scheme is the notice which has been served on the trustee, through a Liverpool solicitor, claiming the right to make an increased offer. Our readers will remember that the debtors' offer of 5s. was refused on account of a higher bid of 6s. by Mr. Hawkins on account of a creditor. We understand that the debtors' syndicate have offered 6s. 8d., but that Mr. Hawkins has increased his offer to 7s. 6d. on behalf of one of the creditors.

## THE NEW CHESHIRE ALKALI COMPANY'S WORKS AT MIDDLEWICH.

DURING the past fifty years, Middlewich, unfortunately for itself, has not enjoyed that degree of prosperity which has attended many of its neighbours. Years ago it was an important Cheshire town, comparatively speaking, but it has not kept pace with the times, and the consequence is it is outdone in the struggle for existence by its younger neighbours, Northwich, Winsford, and Crewe. It is now only on a level with what it was fifty years ago; in fact, it seems to have retarded, but there are now brighter signs on the horizon. The recently-formed Cheshire Alkali Company,

Belgian Trade.—It is stated that there are in Belgium 4,077 flour mills, 2,574 breweries, 2,249 cloth mills, 1,333 potteries, 806 tanneries and leather works, 665 tobacco factories, 660 slate, stone, and marble works, 577 printing works, and 644 oil mills, making a total of 13,480.

To be Forewarned is to be Forearmed.—A decree has been issued by the German Government, according to which all foreigners crossing the Franco-German frontier must possess passports with the visa of the German Ambassador, or they will be detained. This may cause inconvenience for a time, but a similar regulation has been in force on the Russian frontier without leading to political complications.

From the Argentine Republic.—We hear from a correspondent that the Argentine Goverment has determined on establishing a permanent exhibition of the natural and industrial products of the country in Buenos Ayres. It is sure, remarks our correspondent, to be "a highly interesting show, and if it is not it will certainly not be due to any want of enterprise on the part of the Government. The exhibition is to include all the varied mineral and vegetable products which abound in La Plata, and these will be accompanied with the fullest details as to the place of origin, the cost of transport, and, in some cases, chemical analysis. The committee which is in charge of the affair desires to exchange specimens of the products of La Plata against those existing in the museums of other countries—a transaction which can be effected, we are told, through any consul of the Argentine Republic.

Trade with Mexico.—Mr. José A. Infiesta, Mexican Vice-consul in Manchester, writes to us:—"I am requested by circular from the Chancellor of the Exchequer of Mexico to publicly inform senders of goods to that country that the Custom-house there will not admit invoices written, printed, lithographed, or otherwise with inks containing aniline, fuchsine, etc., which fades very soon. Such invoices must be made with permanent inks, and the writing and character of letters should be distinct, in order to avoid delay and confusion."

Liebig's Extract of Meat.—According to the annual report of Liebig's Extract of Meat Company, the balance of profit and loss account amounts to £102,038, and out of this an interim dividend was paid in February last. The directors now propose to pay a dividend of 7½ per cent. (30s. per share), being, with the interim dividend, 6 per cent. per annum, and a bonus of 6½ per cent. per annum, both free of income tax, to carry £20,000 to the reserve fund, £6,000 to a provident fund, and, after other deductions, £5,177 remains to be carried forward. The reserve fund having accumulated to £93,550, the directors consider it advisable to recommend to the shareholders a distribution, by way of an extraordinary bonus, of £2 per share out of such fund, which will then be reduced to £48,000.

Scotch News.—On Saturday morning, at Greenock, a young married man named William Hunter, lately cashier with Messrs. Poynter and Son, chemical manufacturers, Greenock, was committed for trial on a charge of forgery and embezzling over £200. The accused, when apprehended, was in company with a young lady teacher, with whom it is said he intended to elope. On him were found two tickets for America.

The Portland Cement Industry.—The directors of the Vorwohler Portland-Cement-Fabrik, Prüssing, Planck and Co. state that the situation of their undertaking is very satisfactory. A considerable rise is visible in this year's prices, and the cost of production has been reduced. Larger orders are to hand than was the case in 1887, and the sale of the production is therefore assured. At a recent meeting of the directors of the Oppelner Zementfabrik Grundmann it was stated that the company's sales still continued regular, and that many large orders still remained to be executed. The new apparatus are in working order and operate admirably. The financial results of the current year are expected to be good.—*Kuhlow.*

Avery's Gas Process.—The experiments with Avery's process for obtaining a gas of high illuminating power from the refuse of the petroleum refineries and waste products of gasworks are being steadily carried on at Beckton Gasworks. The scientific staff of the London Gas Light and Coke Company is carefully watching the whole series, and the promoters of the scheme state confidently that their process will effect a saving in the cost price of gas amounting to at least one-third, and that their own product can be freely mixed with ordinary coal-gas, increasing the whiteness of the flame and perfecting combustion.

Explosion in a Gasholder.—A gasholder has exploded at Montreal causing great damage, and, as it is believed, serious loss of life. Fifteen to twenty men who were in the neighbourhood at the time are all supposed to have been killed. Five bodies have been recovered, and the remainder are thought to be buried in the *débris*. The building was undergoing repairs, and the explosion occurred through a leak of gas, which became ignited from a lantern foolishly carried into the works. Some painters who were at work on the roof were blown fifty feet into the air. It is supposed that as many as thirty persons were more or less injured. The building is a total wreck, nothing but the pillars remaining standing.

Welsh Gold.—Mr. Pritchard Morgan has left North Wales for London with the produce of the recent stamping operations at the Gwynfynydd Gold Mines. The result of the quartz crushing during the period of the Government injunction forbidding the removal of gold has realised no less than 1,400 ounces of the precious metal, which Mr. Pritchard Morgan values at £10,000. Mr. Morgan has taken all the bars of gold up to London. He states that the prospects of the mine were never so encouraging as at present.

Explosion at a Cartridge Works.—A terrible explosion occurred at four o'clock on Thursday afternoon, the 17th ult., at M. Merlot's cartridge and fireworks manufactory, situated between Pantin and the Pré St. Gervaise, near Paris. The effects of the accident are most disastrous. Seven buildings have been destroyed or seriously damaged, and up to last night twelve dead bodies and thirty injured men had been found in the ruins. The search for the dead and injured was being actively pursued. The cause of the explosion is not yet known.

The Metropolitan Sewage.—A summary of a report by Sir H. Roscoe on the chemicals used in the deodorisation of metropolitan sewage has been sent us. Starting with the statement that the only use of chemicals in that connexion is "that they either start a process of purification, or simply get rid of the evil odour," Sir H. Roscoe examines the action of the two deodorants—bleaching powder and manganate. He is "not favourably impressed" with the action of bleaching powder on the river, and says that "manganate is preferable." The experiments had been carried out at Crossness and also at Manchester. It is possible that this report may modify the objections of the Tyne authorities, one of which recently complained of the use of manganate locally, as against the use of bleaching powder. But it is probable that the choice of the two disinfectants is determined by whim or fancy, and it is well, therefore, that the Tyne can provide both kinds of deodorants.

London Sewage.—The following letter has lately appeared in *The Times*:—Sir,—Before the London ratepayers are asked to leap out of the frying-pan into the fire by burdening themselves with a sewage farm of 80 square miles in area, it would be well for them to read the first paper in vol. xiii. of the professional papers of the Corps of Royal Engineers, which has just been printed. They will therein find definite information as to the results actually obtained, over a series of years, by the passage of sewage through land, at a cost steadily increasing from £93. 15s. 9d. annual cost per 1,000 persons in 1876 to £212. 10s. annual cost per 1,000 persons in 1886. They would also find the reports of the German experts, Professor Müller, of Berlin, and Dr. König, of Munster, as to the failure of irrigation and other methods of treatment employed in Germany. And they will see how the Royal Engineers have arrived at a solution of what is perhaps the most difficult problem that perplexes modern civilization.

Coal Experiments at Low Walker.—The other day at Low Walker experiments were made with a new furnace, intended to consume bituminous coal without producing smoke. It is quite evident that the Northern coalowners are becoming fully alive to the fact that they have to meet a growing competition with Wales, and any invention which will aid them to meet that competition will be welcome. It is claimed for the furnace tried, that it gives to our local coal a greater evaporative power than Welsh, and it is added that the trials were eminently satisfactory.

Tinning by Simple Immersion.—Argentine is a name given to tin precipitated by galvanic action from its solution. This material is usually obtained by immersing plates of zinc in a solution of tin containing six grammes (about 90 grains) of the metal to the litre (0·88 quart). In this way tin scrap can be utilised. To apply the argentine according to M. P. Marino's process, a bath is prepared from argentine and acid tartrate of potash rendered soluble by boric acid. Pyrophosphate of soda, chloride of ammonium, or caustic

soda, may be substituted for the acid tartrate. The bath being prepared, the objects to be coated are plunged therein, first having been suitably pickled and scoured, and they may be subjected to the action of an electric current. But a simple immersion is enough. The bath for this must be brought to ebullition, and objects of copper or brass or coated therewith may be immersed in it.—*L'Echo des Mines et Metallurgie.*

Electroplating with Aluminum.—H. Reinbold claims to have obtained good results with the following solution: Alum 30 parts, water 300 parts, aluminum chloride 10 parts. This solution is heated to 200° Fah., and after cooling, 39 parts of potassium chloride are added.—*Scientific American.*

The Care of Belting.—The Vampire belt oil, manufactured only by the Canton Paint and Oil Co., of Melrose, Mass., is claimed to be proof against water, decay, stretching, gas, acids or spontaneous combustion. The company has numerous unsolicited testimonials from consumers who have been using it for some time and are entirely satisfied with it. Jobbers find it to their advantage to handle the oil, as they have no difficulty in making sales, and the manufacturers treat them liberally. The consumption of this popular article is increasing to such an extent that the large works in Melrose are run to the fullest capacity, and the shipping department is kept busy sending off the frequent orders.

The Incandescent Gas Light Co. Limited.—A meeting of the shareholders of this company has just been held, when the chairman said, at the last meeting held in March it was anticipated that an agreement by which a reduction of £100,000 would be made on the purchase consideration for the foreign patents would be submitted. The vendors withdrew from that agreement immediately before that meeting. Since then fresh negotiations have been carried on, and a new agreement has been entered into and signed by the vendors, by which the vendors gave up £212,005 out of the purchase consideration of £300,000, certain concessions being made on the part of the company, the principal being that the company out of the 19 patents acquired through the original contract give up four, which the directors consider of minor importance—viz., those for Russia, Finland, Sweden, and Norway. The bearing of this is that the capital of the company is practically reduced to £200,000. It was stated that all the difficulties connected with the manufacture of the light have been virtually overcome, and the directors look confidently forward to large sales and excellent results in future. A resolution was passed approving of the arrangement between the company and the vendors. A dividend at the rate of 2½ per cent. for the period ending the 31st December was then declared.

Cost of the Production of Electric Energy.—M. W. Penkert, in the *Centralblatt fur Elektrotechnische*, gives some practical figures of the cost of electric energy variously produced. Although his figures are susceptible of modification for this country, yet the ratios they determine are highly interesting. The cost of developing 1,000 watts is:

| | | | | |
|---|---|---|---|---|
| 2·66 fr. | when produced by | | | Daniell's battery. |
| 3·77 fr. | ,, | ,, | ,, | Bunsen's battery. |
| 40·07 fr. | ,, | ,, | ,, | Clamond's thermo-electric battery heated by gas. |
| 1·05 fr. | ,, | ,, | ,, | Clamond's thermo-electric battery heated by coal. |
| 0·26 fr. | ,, | ,, | ,, | dynamo and steam engine. |
| 0·62 fr. | ,, | ,, | ,, | dynamo and gas engine. |

In these calculations, 1·8 kilogrammes (4 lb.) of coal per horse-power hour for a steam-engine, and 1 cubic meter ($35\frac{3}{10}$ cubic feet) of gas for a gas-engine for the same work was allowed for.

## WEIGHT OF BARK FROM CINCHONA TREES.

The following interesting information is given by the Director of Government Gardens and Plantations at Jamaica:—Inquiries having been made as to the amount of bark that may be expected from trees of various heights, ten trees were cut down and barked with the following result:—

| Number of Tree. | Height in feet and inches. | Branched at — feet from ground. | Circumference at base in inches. | Circumference of first branch in inches. | Circumference of first branch in inches. | Weight of wet bark from stem in ounces. | Weight of dry bark (taken at one-third). | Weight of wet bark from stem and branches in ounces. | Weight of dry bark (taken at one-third). | Weight of wet bark from root in ounces. | Weight of dry bark (taken at one-third). |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.4 | ... | 6½ | ... | ... | 15 | 5 | ... | ... | ... | ... |
| 2 | 7.8 | ... | 4½ | ... | ... | 10 | 3⅓ | ... | ... | ... | ... |
| 3 | 10.0 | ... | 7½ | ... | ... | 28 | 9⅓ | ... | ... | ... | ... |
| Average | 8.0 | ... | 6⅙ | ... | ... | 17⅔ | 6 | ... | ... | ... | ... |
| 4 | 9.10 | 6½ | 10 | 4 | 2 | ... | ... | 33 | 11 | ... | ... |
| 5 | 10.0 | 4 | 11 | 7½ | 5 | ... | ... | 60 | 20 | ... | ... |
| 6 | 15.3 | 4½ | 15 | 10½ | 4 | ... | ... | 120 | 40 | ... | ... |
| 7 | 20.6 | ... | 16½ | ... | ... | ... | ... | 156 | 52 | ... | ... |
| Average | 13.11 | ... | 13 | ... | ... | ... | ... | 92½ | 31 | ... | ... |
| 8 | 10.0 | ... | 6 | ... | ... | ... | ... | 18 | 6 | 10 | 3⅓ |
| 9 | 11.0 | ... | 12 | ... | ... | ... | ... | 46 | 15⅓ | 24 | 8 |
| 10 | 14.3 | ... | 9½ | ... | ... | ... | ... | 48 | 16 | 14 | 4⅔ |
| Average | 11.9 | ... | ... | ... | ... | ... | ... | 37⅓ | 12½ | 16 | 5⅓ |

## PRIESTMAN'S PETROLEUM ENGINE.

For some time past Messrs. Priestman Brothers, of Hull, have been endeavouring to overcome the difficulties which have hitherto stood in the way of using the ordinary petroleum of commerce as a motive power for engines. In this they have now fully succeeded, as was demonstrated by a petroleum engine which we recently inspected at their London offices, 78a, Queen Victoria-street. In this engine the oil is placed in a closed tank inside the foundation of the engine, and air is pumped into this tank until a pressure of about 5lb. to the square inch is obtained. The oil is then mixed with air until it is formed into a vapour, after which it passes into a closed iron vessel or vaporiser, where it is heated, and from which it is admitted into the engine cylinder and ignited by means of an electric spark. The spark is obtained from a small primary battery capable of doing about thirty hours' work without attention, and which can be renewed at a very small cost. In starting the engine the vaporiser is heated for a few minutes, after which the necessary heat is obtained from the exhaust products of combustion while on their way to the chimney. The cylinder is water-jacketed, the water being kept in circulation by a small pump. After it has once been started the engine works automatically, preparing its own source of power, heating its charge, cooling its cylinder, and supplying its own spark for ignition. The great point here is that only ordinary petroleum is used, which, moreover, is entirely consumed, leaving no residue whatever, the combustion being complete. The cost of working this engine, taking the oil at the present price, is stated to be a little more than a halfpenny per horse-power per hour. The engine is simple in construction and is well adapted for use where steam is inadmissible and coal-gas not obtainable. It has been thoroughly tried and proved in practical work before being brought out.

## PROPORTIONS OF STEAM BOILERS.

In a recent communication to the Société Scientifique Industrielle of Marseilles (says *Engineering*), M. D. Stapfer remarked that as he had never met with any good practical rules for the proportions of boilers for steam engines, he had taken the trouble to examine a very large number of different types, which were working satisfactorily, and from them had deduced the following rules. The water level in the boilers of torpedo boats was usually placed at

two-thirds the diameter of the shell, and in marine, portable, and locomotive boilers at three-fourths this diameter. The surface from which evaporation took place should, however, be made greater as the steam pressure was reduced, that was to say, as the size of the bubbles of steam became greater. To produce 100 lb. of steam per hour at atmospheric pressure this surface should not be less than 7·32 square feet, which may be reduced to 1·46 square feet for steam at 75 lb. pressure, and to ·73 feet for steam at a pressure of 150 lb. It is for this reason that triple-expansion engines can be worked with smaller boilers than were required with engines using steam of lower pressure. The amount of steam space to be permitted depends upon the volume of the cylinders and the number of revolutions made per minute. For ordinary engines it may be made a hundred times as great as the average volume of steam generated per second. The section through the tubes may be one-sixth of the firegrate area, when the draught is due to a chimney from 27ft. to 33ft. high, which in general corresponds to a fuel consumption of 12·3lb. of coal per square foot of grate surface per hour. This area may be reduced to one-tenth that of the grate when forced draught is employed, but for flue boilers without tubes the area through the flues should not be less than one-third or one-fourth the grate area.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

The upward tendency of sulphate of ammonia continues a fairly steady movement, and to-day for June delivery there are probably no sellers at less than £11. 15s. f.o.b. Leith, buyers estimate being very little below this figure. Already some time ago this price had been done on from two to three months advance delivery conditions, and in the meantime forward quotations have gone rather higher. The local feeling in bleaching powder is a trifle firmer, and soda crystals have been rather dearer; but caustic sodas have suffered a drop, and most other chemicals still lean to the falling side. Bichromate of soda and bichromate of potash, however, had both a rather better time last week, and deliveries now very nearly keep pace with production. Paraffins are all weak for the time, and lubricating oils have suffered a further drop in value, most other paraffin products being sustained in price by combination. There is a talk amongst makers of extending the experiment to lubricating oils. General prices current are:—Soda crystals, 41s. net Tyne; alum in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £41, net Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76°, £8. 5s.; 70/72°, £6. 15s.; 60/62, £5. 15s.; and cream, 60/62, £5. 15s., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5, and 1 cwt. casks, £5. 5s. net Tyne; refined alkali, 48/52°, 1/16d., less 2½ % Tyne; salt-cake, 20s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3¾d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 7½d.; chlorate of potash, 5⅝d., less 5 % any port; sulphate of ammonia, £11. 15s. June delivery f.o.b. Leith; sulphate of copper, £21; paraffin scale, hard, 2 7/16d., soft, 2d.; paraffin wax, 120° semi-refined, 2 11/16d.; paraffin spirit, 4½d.; burning oil, 5⅜d. to 6d.; lubricating oil, 865°, £4. 15s. to £5; 885° £6 to £6. 10s.; and 890/95 £7. 10s. to £7. 15s.

## THE LIVERPOOL MINERAL MARKET.

The market has maintained its firmness, and prices rule steady. Manganese: Arrivals still continue small, and prices are unaltered. Magnesite (containing 98 per cent. of carbonate of magnesia) unchanged at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand): Increased sales continue to be made at full prices; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals have very much fallen off, and, notwithstanding the Whitsuntide holidays, a fair amount of business has been done at full prices—90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate): The good demand continues; selected crystal lump is scarce at £6. 5s.; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds, ar nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5 selected crystal ground, £8. 10s. Sulphate, steady lump, 35s. 6d.; good medium, 30s.; medium, 25s. 27s. 6d.; common, 18s. 6d. to 20s.; ground, best whit brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. stone: Prices have advanced; ground, at £8; s selected lump, finest quality, £11. 10s. Purple Spanish manganiferous ore, 18s. to 20s. c.i.f. for delivery. Emerystone continues in demand, especi good qualities—£5. 5s. to £5 15s. for lump; and sma Fullers' earth steady: 45s. to 50s. for best blue and fine impalpable ground, £7. Wolfram and tungstate quiet. Tungsten metal at 2s. 6d. per lb. Chrome 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome o 50 per cent. being in demand. Antimony ore firm; £22 for fair quality. Antimony metal unchanged. U 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; grades, £14 to £15. Potters' lead: Smalls, £11. 10s. selected lump, £13 to £14. Calamine quiet, 60s. Strontia steady: Sulphate (celestine), 17s. 6d; more Carbonate (native), £15 to £16; powdered (manufa £11 to £12. Limespar, 45s. for ground. Plumbag Ceylon lump is £25 to £35; good, £20 to £21; chip £16; best ground, £20, £25, and £30; Italian and Bo £4 to £12 per ton. French sand, in cargoes, 16s. Ferromanganese: 80 per cent. packed, £11. 2s. 6d.; cent. packed, £10; 60 per cent. packed, £8. 16s.; 50 p unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. 20 per cent., £4. 12s. 6d. Silicon spiegel, 9 per ce Chrome pig, 10 per cent., £8. 10s. to £10. Bitumen picked, £35; original prime, £18 to £23; and go Ground mica, £50. China clay: Common, 18s. 6d. medium, 22s. 6d. to 25s.; best, 30s. to 35s.

## LIVERPOOL CHEMICAL MARKET.

Chemicals continue steady, and practically there alteration to report in prices. Soda ash 1d. up. soda: 60 % white, £5. 17s. 6d.; 60 % cream, £5. 15s. white, £6. 17s. 6d.; 74 %, £7. 10s.; 76 %, £8. 5s. to £8 Bicarbonate, £6. 10s. Nitrate of soda, 9s. 9d. to 10s. crystals, £2. 15s. Silicate of soda: Brown lump, £6 Green lump, £5. 7s. 6d.; 100 degrees solution, £4. 1 and 75 degrees solution, £3. 12s. 6d. Bleaching p £7. 12s. 6d. for hardwood, and £7. 10s. softwood. Sa 21s. 6d. Bichromate of potash at 4¾d. Bichromate o 3½d. Carbonate of potash, £18 to £20. Chlorate of 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of 21s. to 23s. Chloride of barium, £9. Hydrate of bariu Dioxide of barium, 8½d. per lb. Arsenic, £12. 5s. to £1 strong. Lump, little offering. Saltpetre: Crystals, ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s thirds, £4. 10s. Sulphate of copper, firm at £23. fixe, £8. 10s. Manganese: Sulphate, £16 to £17; c of manganese, £20 per ton; carbonate, £12. 10s; borat English make, 6d. Hydrate of alumina, £24. 10s. P tated carbonate of magnesia, 50s. Chloride of mag (antiseptic) strong, at 45s. to 50s. Chloride of calciu Epsom salts, 70s. to 75s. Muriate of ammonia: Whit Refined borax unaltered. Verdigris, 1s. per lb. Ace lime, £12. 5s. Bisulphide of carbon, £15. Chlor sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. ashes, £2. 3s.

## THE LIVERPOOL COLOUR MARKE

Colours are unaltered. Ochres: Oxfordshire is £10, £12, £14, and £16; Derbyshire, 50s. to 55s. best, 50s. to 55s.; seconds, 47s. 6d.; and common Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 3 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, carg arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White £21. 10s. to £22. Red lead, £19 to £20. Oxide of V.M., No. 1, £19; V.M., No. 2, £18. Venetian red, Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: white, 60s.; good, 40s. to 50s. Rouge: Best, £24; dit jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Ox iron, prime quality, £10 to £15. Paris white, 60s. En green, 10d. per lb. Derbyshire red, 60s. Vermilic 10d. per lb.

## CELLANEOUS CHEMICAL MARKET.

is no improvement as yet to record in the general trade, and prices all round are weak. Alkali manu- are still able to maintain prices for soda-ash, which ith moderate demand. Soda crystals are in plentiful t low prices. Caustic soda is without change in £6 12s. 6d. for 70 % rails, Lancashire. The sale of le, 77 %, is making steady progress, the output now 50 tons per week. Sulphate of copper is rather £21 10s. to £22. Tin and zinc salts are without Acetates of lime are still quiet, but at low prices rcels have recently been changing hands. Acetic till very dull and inclined to droop in price with the erial. Lead salts and litharge are without further n prices, but orders are scarce. Yellow prussiate of is still slow of sale at 6¾d. for British, and 6⅞d. for Carbolic acid crystal is rather lower, and more fered.

## METAL REPORT.

he last week there has been a holiday tone in all . Iron has declined daily, falling from 37s. 9d. to ., the lowest figure it has touched for thirty years. has been steady, for cash it has been a little easier, three months the price has risen nearly £2. Efforts g made by engineers and other large consumers of to utilise iron and steel in its place, but it remains to whether this attempt will succeed. There appears ent no weakness on the part of the very strong ation that has taken this metal in hand. Tin: At the comparatively low price there has been considerable on the part of consumers and large sales have been nd there is a prospect of higher prices. In spelter and markets have been steady; but silver has been very he lowest price it has ever been known 41¾d. per oz.

## SULPHATE OF AMMONIA MARKET.

London sulphate market is reported quiet but steady, en it is made known that there is a big bear move- , the information should put makers on their guard. a of the bear speculator is to so depress the market at he will be able to buy in for June-September at low prices. If makers consult their own interests ll study the markets very closely, when they will find re is very little sulphate offering, and that the stocks eedingly small. It is reported that Beckton holds ,000 to 2,500 tons at present, but it must not be n that this is not *bona fide* stock, as the major portion old and is being delivered. Hull values to-day may d as £11. 15s., and the same prices are said to be t Beckton, London, and Leith for good legitimate s, If the market recedes from this it will be the own fault in not making the most of a good demand mall production.

## THE TAR PRODUCTS MARKET.

Whitsuntide holidays have not so seriously interfered siness as was at the time anticipated, and some of ducts have gained in stability. Benzols, however, 's and 50/90's are a shade weaker than stated in our k's report, and crude carbolic is in a very bad way; who were eager buyers some few weeks ago will look at it now. On the other hand, anthracene is d we hear a large London firm has sold largely at , while a provincial firm of repute has realised over for A quality. Creosote of good quality for Lucigen es off very readily. Pitch has an upward tendency, s reported that Beckton has sold 8,000 tons at 16s. ester and Liverpool price is reported to be 13s. f.o.b. ces which are being paid for tar at the gas works by illers is getting an enigma to some, but we put it at those who are paying these high prices can see than their confrères, and that possibly something ay be in store for the tar trade yet.

# New Companies.

ALLIANCE ALUMINUM COMPANY LIMITED.—Capital £500,000, in £10 shares.

| First Subscribers:— | Shares. |
|---|---|
| E. Steer, Hounslow | 1 |
| H. Berkeley James, 16, Ashburn-place, N.W. | 1 |
| H. Mc.Alpine, Maidstone | 1 |
| C. W. Miller, St. James'-chambers, Duke-street | 1 |
| C. M. Wilkins, 19, King's Arms-yard | 1 |
| C. H. Rooke, 11, Hyde Side-villas, Edmonton | 1 |
| G. Glentworth, junr., Garrick Club | 1 |

GUNPOWDER COMPANY LIMITED.—Capital £200,000, in £5 shares.

| First Subscribers:— | Shares. |
|---|---|
| J. H. Chapman, 64, Wellington-street, Woolwich | 1 |
| J. Stevenson, junr., 23, The Green, Richmond, solicitor | 1 |
| F. C. Chapple, Claremont-road, Highgate, N., solicitor | 1 |
| J. Alexander, Danby-street, Peckham, S.E., accountant | 1 |
| E. S. Harper, Goodrich-road, East Dulwich, S.E., accountant | 1 |
| W. H. Adams, 165, Friern-road, East Dulwich, S.E., accountant | 1 |
| F. T. Marney, 12, Bradley-road, Wood-green, N. | 1 |

HEWETT'S COMBUSTION AND STEAM GENERATING COMPANY LIMITED.—Capital £150,000, in £1 Shares. Subscribers:—

| | Shares. |
|---|---|
| R. Hewett, 108, Alston-street, Birmingham | 1 |
| R. W. Hewett, 196, John's-hill, Wandsworth, engineer | 1 |
| R. B. Lugg, Hartley-place, St. Vincent-street, Birmingham, die sinker | 1 |
| A. J. Gilbert, 55, Church-street, Lozells, toolmaker | 1 |
| A. Peel, 91, Vyse-street, Birmingham, merchant | 1 |
| R. Peel, 91, Vyse-street, Birmingham, traveller | 1 |
| S. W. Blake, Marroway-street, Icknieldport-road, Birmingham | 1 |

LEVERSTOCK AND ACORN RED BRICK COMPANY LIMITED.—Capital £6,000, in 600 shares of £10 each.

LOCO WASTE MANUFACTURING COMPANY LIMITED.—Capital £10,000, in £1 shares.

| Subscribers:— | Shares. |
|---|---|
| M. M. Williams, Heapey, near Chorley, surgeon | 1 |
| J. H. Williams, Huyton, near Liverpool, merchant | 1 |
| M. W. Hydes, Broad-green, Liverpool, merchant | 1 |
| J. L. Hydes, Edge-lane, Liverpool, clerk | 1 |
| C. C. Hydes, Edge-lane, Liverpool, clerk | 1 |
| L. J. Gates, Church-road, Willesden, engineer | 1 |
| R. S. Williams, Bootle, engineer | 1 |

MATHER EUROPEAN PATENT BLEACHING COMPANY LIMITED.—Capital £40,000, in £10 shares.

| Subscribers:— | Shares. |
|---|---|
| J. T. Rickman, Chobham, Surrey, merchant | 1 |
| E. de Pass, 68, Fleet-street, patent agent | 1 |
| A. B. Wood, 17, St. Bride-street, merchant | 1 |
| C. Cross, 4, New-court, W.C., consulting chemist | 1 |
| E. J. Bevan, 4, New-court, W.C., consulting chemist | 1 |
| C. M. King, 4, New-court, W.C., consulting chemist | 1 |
| C. Brace, 110, Grosvenor-park, Canonbury | 1 |

W. SHARP AND COMPANY LIMITED.—Capital £10,000, in £10 shares

| Subscribers:— | Shares. |
|---|---|
| R. Lucas, 8, Cromwell-crescent, S.W. | 1 |
| W. S. Jones, 85, Wickham-road, Brockley, S.E. | 1 |
| R. Marsh, Ingleside, Epping | 1 |
| A. E. Davies, Southfields, Putney, clerk | 1 |
| P. H. Crouch, 66, Barbican, microscope manufacturer | 1 |
| S. Ashley, 36, Milton-road, Herne-hill, seed merchant | 1 |
| W. R. May, 25, Clark-street, Stepney, shorthand writer | 1 |

SOUTH DURHAM ALKALI COMPANY LIMITED.—Capital £85,000, in £10 shares.

| Subscribers:— | Shares. |
|---|---|
| Sir Wm Guyer Hunter, M.P., 21, Norfolk-crescent | 1 |
| Sir John Morris, Bart., Bycullah-park, Enfield | 1 |
| John Vivian, C.E., St. Bees | 1 |
| W. Mc.Cowan, Roseneath, Whitehaven, ironmaster | 1 |
| A. H. Strongitharm, C.E., Barrow-in-Furness | 1 |
| G. Glover, junr., 6a, Victoria-street, engineer | 1 |
| W. E. Simmons, 77, Devonshire-road, N., clerk | 1 |

WILLIAMSON'S DRUG COMPANY LIMITED.—Capital £1,000, in £10 shares.

# Gazette Notices.

### PARTNERSHIPS DISSOLVED.

WILKINSON & Co., Birmingham, engineers.
J. KEEN & Co., Kinson, Dorset, brick manufacturers.

### THE BANKRUPTCY ACT, 1883.

#### Receiving Orders.

DAY, THOMAS TUNNICLIFFE, and BRIAN, THOMAS, Longton, Staffordshire, earthenware manufacturers.
BLACK, ROBERT, Whalton and Morpeth, Northumberland (trading with W. Bell), aerated water manufacturer.
CAMPBELL, ALICE, Gateshead, mineral water manufacturer.

#### Adjudications.

BAKER, FRANCIS ROBERT, Birmingham, late of South Littleton, near Evesham, manufacturing inventor.
BOND, CLAIRE PHILLIPINE (trading as C. P. Bond & Co.), Bordesley-green, Birmingham, brickmaker.
CAMPBELL, ALICE, Gateshead, mineral water manufacturer.
VOLK, MAGNUS, Brighton, electrical engineer.

#### First Meetings and Public Examinations.

BOND, CLAIRE PHILLIPINE (trading as C. P. Bond & Co.), Bordesley-green, Birmingham, brickmaker. First meeting June 6th, 25, Colmore-row, Birmingham. Public examination June 19th, County Court, Birmingham.
SHELLARD, NATHAN JOHN, Monmouth (trading with G. Lindsey as the Monmouth Colour Company) paint and colour manufacturer. June 4, Official Receiver's office, Newport; June 8, County Court, Newport.
EVANS, JOHN COOPER, Eveline-villa, Dacre-road, Upton Manor, late of Boston-road, Hanwell, oil and colourman. June 5, Bankruptcy buildings, Portugal-street, Lincoln's Inn Fields. June 15, 34, Lincoln's Inn Fields, London.

HASLIP, JAMES FREDERICK, New Southgate, Middlesex, oil and colourman. June 7, 30 and 31, St. Swithin's lane, E.C.; June 12, Court-house, Edmonton.
BLACK, ROBERT, Whalton and Morpeth, Northumberland (trading with W. Bell), aerated water manufacturer. June 7, Official Receiver's office, Newcastle-on-Tyne; June 7, County Court, Newcastle-on-Tyne.
CAMPBELL, ALICE, Gateshead, mineral water manufacturer. June 9, Official Receiver's office, Newcastle-on-Tyne; June 7, County Court, Newcastle-on-Tyne.

**Notices of Dividends.**

HEWETT, ROBERT ILES, Bristol, brewer. First and final dividend of 8s. 11½d., June 7, Bank Chambers, Cross-street, Bristol.
MOODY, ALFRED, Wimborne Minster, Dorsetshire, chemist and druggist. First and final dividend of 9d., June 12, Mr. H. W. Dibbin's, Wimborne.

# The Patent List.

*The following List has been compiled expressly for* THE CHEMICAL TRADE JOURNAL *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

**Drying and Warming Air.**—(Complete Specification.) R. Lofthouse. 7361. May 18.
**Retorts for Distilling Shale.** J. C. Hamilton. 7379. May 18.
**Driving Tunnels in Water-bearing Soil.** J. H. Vering. 7381. May 18.
**Protection of Bank Notes from Falsification.** F. M. Rogers. 7389. May 18.
**Preventing Alteration of Cheques.** F. M. Rogers. 73990. May 18.
**Treating Wood by Tar Oils.** R. Avenarius. 7398. May 18.
**Illuminating and Heating Gas from Water.** S. H. Linn. 7400. May 18.
**Engines Worked at High Temperatures.** M. P. W. Boulton. 7402. May 18.
**Saccharometers.** A. Horn. 7411. May 19.
**Water Motors.** F. Bosshardt. 7439. May 19.
**Utilisation of Lime-mud Refuse.** J. S. Rigby. 7456. May
**Engines Worked by Volatile Liquids.** A. F. Yarrow. 7467.
**Explosive Compounds.**—(Complete Specification.) H. J. Allis May 22.
**Sulphuretted Hydrogen by the Ammonia Process.** E. W and J. Simpson. 7507. May 22.
**Preparation of Amido-Dimethyl Chloride.** J. Dawson and R 7511. May 22.
**Hydrocarbon Motors.** C. T. Wordsworth. 7521. May 22.
**Lubricating Composition.** W. P. Kelly. 7524. May 22.
**Coating Metal Plates with Tin and other Metals.** E. I Davies, J. Davies, and B. A. Webb. 7525. May 22.
**Purification of Water and Sewage.**—(Complete Specification Newton. 7533. May 22.
**Vacuum Drying Apparatus.**—(Comple Specification.) E. F 7555. May 22.
**Transferring Phototypes to Lithographic Stones.**—(Comple fication.) O. Krebs. 7556. May 22.
**Receptacles for Liquid Carbonic Acid.**—Completete Speci A. Knoop. 7559. May 23.
**Preventing the Bursting of Waterpipes.** T. W. Lethere May 23.
**Preventing Boiler Scale.**—(Complete Specification.) A. D. I and G. Köszegi. 7587. May 23.
**Drying and Seasoning Timber.** G. H. Elland. 7594. May
**Vitrifiable Colours or Pigments.** V. J. Kness. 7607. May
**Indicating Apparatus for Noxious Gases.** G. D'Orvill May 23.
**Supplying Hydrocarbon Oils to Burners.** J. B. Fenby May 24.
**The Culloden Partition Brick.** W. Ross. 7618. May 24.
**Flanging Copper and other Tubes.** J. Douglas and A. 7630. May 24.
**Filtering and Decolouring Liquids.**—Complete Specificati P. Thompson. 7640. May 24.
**Treatment of Scab in Sheep.** G. W. Bötz. 7651. May 24.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 19th.*

**Acetic Acid—**
Germany, 27 pkgs. Beresford&Co.
France, 1 cs. Pokorny,Fielder & Co.
Holland, 30 cbys. Spies Bros.&Co.
" 90 Beresford&Co.

**Alum—**
Holland, 81 cks. OhlenschlagerBros.

**Acetate of Lead—**
France, 17 cks. Lister & Biggs

**Acetate of Lime—**
U. States, 190 bgs. Middleton & Co.

**Alkali—**
France, 100 c. Henderson,Craig&Co.

**Bones—**
Melbourne, 6 t. Beresford & Co.
Townsville, 6 Dyster,Nalder&Co.
U. States, 19 H. A. Lane & Co.
Brisbane, 7 Goad, Rigg & Co.
Rockhampton, 5 t. Anning & Cobb

**Barytes—**
Germany, 19 cks. P. Jantzen
Belgium, 20 Leach & Co.
" 20 J. L. Lyon & Co.
Germany, 23 O'Hara & Hoar

**Brimstone—**
Italy, 4 t. G. W. Bristow
" 10 C. H. Gray

**Borax—**
Italy, 77 pkgs. J Puddy & Co.
" 13 cks. "

**Bromine—**
Germany, 12 cs. T. Jordan & Co.

**Cream Tartar—**
France, 20 cks. Webb,Warter&Co.
" 5 W.V.Robinson&Co.
" 5 Sutcliffe & Gosden
Italy, 80 B. Jacob & Sons
" 20 W. Carter
France, 9 Webb,Warter&Co.
Spain, 5 Novello & Co.

**Chemicals** *(otherwise undescribed)*
Germany, £83 T. H. Lee
" 504 A. & M.Zimmermann
" 47 Spies, Bros. & Co.
" 47 "
" 20 Ross & Deering
" 60 T. H. Lee
" 36 Phillipps & Graves
" 50 T. H. Lee
" 18 L. & S. K. D. Co.
" 214 A. & M.Zimmermann
" 491 "

**Camphor Oil—**
*Germany*, 4 cks. A. Zumbeck & Co.

**Caoutchouc—**
East Indies, 15 c. L. & S. K. D. Co
" 80 N. S. S. Co.
Madagascar, 6 Blyth,Greene&Co.
C. America, 4 Lewis & Peat
Cape, 30 Hammond & Co.
" 15 W.M.Smith&Sons
Madagascar, 5 Blyth,Greene&Co.
Tamatave, 18 J. H. & G. Scovell
Cape, 10 J. Owen
" 20 W M.Smith&Sons
Portugal, 85 Kebbel,Son&Co.
Mozambique,11 L. & S. K. D. Co.
Madagascar, 31 Perkins & Homer
Mauritius, 15 Blyth,Greene&Co.
East Indies, 3 Arbuthnot,Ewart and Co.

**Caustic Potash—**
France, 14 dms. Petri Bros.

**Dyestuffs—**
**Argols**
Italy, 106 bgs. J. Turner & Co.
" 1,458 B. Jacob & Sons
**Annatto**
E. Indies, 4 bgs. Cotesworth&Powell
**Aniline**
Germany, 60 cs. P. & O. Co.
Holland, 18 Union Lighterage Co.
**Cochineal**
Canary, 20 bgs. Marshall & French
**Anthracene**
Holland, 38 cks. Burt,Boulton&Co.
**Tanners' Bark**
Germany, 23 t. L. & S. K. D. Co.
**Extracts**
Germany, 5 cks. Fulwood & Bland
France, 20 G. S. N. Co.
U. States, 10 brls. W.Burton & Sons
France, 50 cks. Webb, Warter & Co.
" 80 L. J. Levenstein & Sons
Denmark, 15 cks. Bailey & Leetham
Anstria, 500 brls. R. J. Humphery
E. Indies, 5 cs. Hoare,Wilson & Co.
**Indigo**
E. Indies, 7 chts. E. & W. I. D. Co.
" 1 bx. 9 Adamson & Ronaldson
" 92 Arbuthnot,Latham&Co
" 67 L. & S. K. D. Co.
" 51 R. von Glehn & Sons
" 17 Benecke,Souchay&Co
" 13 E. & W. I. D. Co.
" 55 "
" 6 Benecke,Souchay&Co.
" 11 Langstaff & Co.
**Shumac**
Italy, 500 bgs. Beresford & Co.
" 1,800 G. Gaines
**Madder**
Holland, 3 cks. Skilbeck Bros.
**Myrabolams**
E. Indies, 667 bgs. Baxter & Hoare
" 791 E. & W. I. D. Co.

**Myrabolams**—*continued.*
E. Indies. 39 bgs. L. & S. K. D. Co.
" 1,334 Beresford & Co.
**Orchella**
E. Indies, 69 bls. Lewis & Peat
Portugal, 110 H. Lorenz
**Turmeric**
E. Indies, 500 bgs. G. & H. Green
" 101 L. & S. K. D. Co.
**Valonia**
A. Turkey, 326 t. J. Graves

**Dextrine—**
Germany, 200 sks. Ross & Deering
" 200 bgs. "
" 100 L. Wood
" 1 cs. E. & W. I. D. Co.
" 20 bgs. C. Faust & Co.
" 100 bls. Proprs. Dowgate Dock

**Guano—**
Sweden, 164 t. Anglo-Swedish Co.

**Glycerine—**
Germany, £34 Beresford & Co.
Holland, 370 Spies Bros. & Co.

**Gutta Percha—**
B.W. Indies, 5 c. J. Browne & Son

**Glucose—**
Germany, 500 c. De Paiva, Norman and Co.
" 240 J. Knill & Co.
" 205 Anderson, Becker and Co.
" 200 P. W. Hore
" 25 Spies, Bros. & Co.
" 200 Fellows,Morton&Co
" 205 Pillow, Jones & Co.
" 88 C. S. Lovell
Holland, 200 J. Barber & Co.
Germany, 100 J. Knill & Co.
" 86 Union Lighterage Co.
" 300 J. Barber & Co.
" 480 Tolme & Runge
" 100 C. Southwell
" 296 M. D. Co.
" 104 P. Windmuller
U. States, 100 "
" 400 Leach & Co.
Germany, 193 H. Wiskemann&Co.
" 104 G. Doo
" 160 Props. Chamberlain's Wharf
" 546 J. Knill & Co.
" 200 Fellows,Morton&Co
" 600 J. F. Ohlmann
France, 200 M. H. Voss
" 100 Barret,Tagant & Co.
Germany, 20 "
" 1,205 M. D. Co.
" 520 T.M.Duche & Sons
" 221 Andorsen, Becker and Co.
" 250 Middleton, Son&Co

**Glucose**—*continued.*
U. States, 100 c. P. Wi
Germany, 384 J
**Isinglass—**
E. Indies, 38 cs. L. & S.
" 6 E. & W.
" 7 pkgs. Kebbel,
" 5 cs. Clarke
" 5 L. & S.
**Manure—**
**Phosphate Rock**
Aruba, 340 t. E. F.
France, 174 Anglo-Gua
" 90 E. Packa
Portugal, 250 J. A.
" 250
U.States, 2,550 Wyllie &
France, 200 Anglo-Guan
Sombrero, 500 Pickford&W
**Bone Meal**
E. Indies, 210 t. Bakewell,
" 200 T.J.Cornw
**Phosphate Lime**
Belgium, 360 t. Lawes Ma
France, 135 "
Germany, 50 T. Farm
France, 163 Couper, M
**Kainit**
Germany, 20 t. T. W. Be
" 10 "
**Roller Waste**
U. States, 3 t. C. A. & H.
**Salt**
Germany, 20 t. Hunter, Wa
**Naphtha—**
Germany, 10 dms. Ste
" 10 Darli
U. States, 85 brls. Lister
**Potassium Sulphate—**
Germany, 18 cks. Beresfo
" 100 bgs. F. W. Be
" 100 B. Jacob
**Potassium Prussiate—**
Germany, 10 cks. A. & M. Zimm
**Paraffin Wax—**
Germany, 56 brls. H. Hill
**Plumbago—**
E. Indies, 283 brls. Elk
" 60 R. G. Ha
Germany, 60 cs. E. Pink
" 10 Wright & As
" 17 cks. P. Heck
E. Indies, 44 R. G. Ha
Holland, 4 cs. G. Rowne
**Pyrites—**
Spain, 1,760 t. Tennant, So
**Pearl Ash—**
France, 190 c. Pe

**Pitch**—
France, 110 brls. R. & H. Annison
**Potash**—
France, 40 c. M. H. Voss
**Soda Ash**—
Belgium, 466 c. Horne & Crampton
Holland, 400 Henderson, Craig & Co
" 200 "
**Salicylic Acid**—
Germany, 4 cs. Burgoyne, Burbidge & Co.
**Saccharine**—
Germany, 30 cks. N. S. S. Co.
" 28 Williams, Torrey and Co.
**Sugar of Lead**—
Germany, 15 cks. Williams, Torrey and Co.
**Saltpetre**—
Germany, 50 bgs. P. Hecker & Co.
" 58 cks. J. Hall & Son
" 35 pkgs. P. Hecker & Co.
Belgium, 200 bgs. Anglo-C. Guano Works
E. Indies, 1,626 C. Wimble & Co.
" 1,853 E. & W. I. D. Co.
" 1,270 Clift, Nicholson and Co.
" 908 Hunter, Waters and Co.
**Stearine**—
France, 232 bgs. H. Hill & Sons
Germany, 2 pkgs. H. Lambert
**Sodium Acetate**—
France, 8 cks. Lister & Biggs
" 10 A. Zumbeck & Co.
**Sodium Sulphite**—
Belgium, 18 cks. Petri Bros.
**Salts of Potash**—
Holland, 20 cks. J. Barber & Co.
**Tartaric Acid**—
Holland, 12 cks. Middleton & Co.
" 4 "
" 20 Webb, Warter & Co.
" 16 "
Belgium, 10 Un. Lighterage Co.
**Tincal**—
E. Indies, 55 bgs. J. Puddy & Co.
**Tartars**—
Italy, 17 cks. J. Knill & Co.
" 248 bgs. W. Newman & Co.
**Ultramarine**—
Holland, 2 cs. A. Zumbeck & Co.
Belgium, 17 pkgs. Leach & Co.
" 1 W. Harrison & Co.
France, 1 G. Rahn & Co.
Belgium, 5 brls. Leach & Co.
Holland, 7 pkgs. A. Henry & Co.
" 8 G. Steinhoff
" 3 cs. H. Kohnstann
France, 10 brls. 4 cs. Rahn & Co.
Germany, 10 cks. 1 cs. Phillipps and Graves
Holland, 16 A. Henry & Co.
" 5 cs. G. Steinhoff
France, 10 G. Rahn & Co.
**Verdigris**—
France, 1 ck. D. Magnus
**Zinc Oxide**—
Germany, 20 cks. Randall Bros.
" 20 M. Ashby
" 100 brls. "
Holland 63 cks. "

## LIVERPOOL.

*Week ending May 23rd.*

**Acetic Acid**—
Rotterdam, 20 bskts.
**Albumen**—
Trieste, 5 cs.
**Boracic Acid**—
Hamburg, 3 cks.
**Barytes**—
Antwerp, 6 brls.
**Blood (Dried)**—
Boca, 305 bgs.
**Camphor**—
Hamburg, 1 brl.
Rouen, 4 cks. R. J. Francis & Co.
**Carbolic Acid**—
Hamburg, 1 ck.
**Copper Sulphate**—
Hamburg, 36 cks.
**Chloroform**—
Hamburg, 1 cs.
" 2
**Cream Tartar**—
Marseilles, 1 ck.
Barcelona, 2
Bordeaux, 1
**Caoutchouc**—
Hamburg, 35 cks
Carthagena, 12 bls. Widow Duranty & Son
Villa Nova, 19 bgs. Jose de la Leitas
Akassa, 1 kg. Royal Niger Co.
Addah, 7 cs. 1 brl. Pickering and Berthoud
" 14 2 cks. W. J. Rodatz & Co.
Accra, 4 cks. 1 cs. Edwards Bros.
" 1 E. H Perrin & Co.
" 9 W. B. M'Iver & Co.
" 2 C. Lane & Co.
" 3 C. F. Johnson
" 5 W. Duff & Co.
Salt Pond, 2 cs. Pickering & Berthoud
" 3 brls. Radcliffe & Durant
" 2 T.E.Tomlinson&Co.
C.C.Castle, 2 ck. Radcliffe & Durant
" 1 Pickering & Berthoud
" 3 Bennett&Brotherton
" 3 pk. 2 W. Ashcroft & Co.
" 2 9 "
" 3 Grimwade, Ridley and Co.
" 3 1 Havard & Co.
" 2 Carle Freece
" 1 cs.
" 1 ck. C. H. de Voss
" 1 Fletcher & Fraser
" 1 Edwards Bros.
Grand Bassa, 2 brls. Co. F. de l'Afrique Occ.
Sierra Leone, 47 cks. Pickering & Berthoud
" 63
" 126 brls. Co. F. de l'Afrique Occ.
" 6 cks. Paterson & Zochonis
Manaos, 604 cs. Singlehurst & Co.
" 249
" 23 Bieber & Co.
Para, 8 cs. Thin & Sinclair
" 12 Heilbut, Symons & Co.
" 4 R. Singlehurst & Co.
**Ceresine**—
Hamburg, 1 cs.
" 2
**Chemicals** *(otherwise undescribed)*
Rouen, 18 cks. Co-op. W'sale Soc.
Rotterdam, 11 cks.
**Dyestuffs**—
**Cutch**
Hamburg, 200 bxs.
Bombay, 1 cs. Morewood & Co.
**Madder**
Rotterdam, 1 ck.
" 2
**Myrabolams**
Bombay, 425 bgs. E.D.Sassoon&Co.
" 3,585
" 319
**Extracts**
Rouen, 277 cks. Co-op. W'sale Soc.
**Gambier**
Singapore, 443 bgs. 4863 bls.
**Shumac**
Trieste, 86 bls.
" 10 brls.
**Alizarine**
Rotterdam, 6 cks.
**Divi Divi**
Hamburg, 163 bgs.
**Cochineal**
Grand Canary, 56 bgs. Ohlendorff and Co.
**Ether**—
Hamburg, 6 cs.
" 25
**Glycerine**—
Rotterdam, 9 cbys. 1 cs.
Hamburg, 1 brl.
**Guano**—
Navassa, 508 t.
St. John's, Nfld. 292 bgs. Job Bros.
**Glucose**—
Rouen, 45 cks. Co-op. W'sale Soc.
Hamburg, 14
**Iron Oxide**—
Trieste, 27 brls. E. Chandoux
" 14
**Naphtha**—
Rotterdam, 4 dms.
**Pyrites**—
Huelva, 1,120 t. Tennants & Co.
" 1,734 Matheson & Co.
" 1,632 "
" 1,794 "
" 1,418 "
**Potash**—
Rouen, 54 cks. Co-op. W'sale Soc.
**Pitch**—
Rotterdam, 67 cks. J. R. Peace & Co.
**Salts of Potash**—
Hamburg, 100 brls.
" 27 cks.
" 1,147 bgs.
" 21 kgs.
**Sugar of Lead**—
Hamburg, 7 cks.
**Saltpetre**—
Hamburg, 50 cks.
" 100
**Sulphur, Flowers**—
Marseilles, 4 cks.
**Tincal**—
Bombay, 10 bgs.
**Tartaric Acid**—
Rotterdam, 15 cks.
**Ultramarine**—
Rotterdam, 20 cs.
Trieste, 35
**Verdigris**—
Bordeaux, 7 cks.
**Waste Salt**—
Hamburg, 1,000 c.
" 102 bgs.
" 180 t.
" 200 bgs.
**Zinc Oxide**—
Hamburg, 50 cks.
Antwerp, 65
" 50 brls.

## GLASGOW.

*Week ending May 26th.*

**Barytes**—
Rotterdam, 69 cks.
**Caustic Potash**—
Dunkirk, 21 dms.
**Dyestuffs**—
**Shumac**
Dunkirk, 20 cks.
**Madder**
Rotterdam, 9 cks. J. Rankine & Son
**Alizarine**
Rotterdam, 29 cks.
" 159
" 161
**Extracts**
Antwerp, 17 cks.
New York, 4 brls.
**Ether**—
Hamburg, 1 cby.
**Fluorchrome**—
Rotterdam, 12 cks. J. Rankine & Son
**Glucose**—
Amsterdam, 50 bgs.
Rotterdam, 22 cks.
**Glycerine**—
Antwerp, 5 cks.
**Potash**—
Dunkirk, 155 cks. 20 dms.
Montreal, 8 brls.
**Pitch**—
Antwerp, 9 cks.
**Potassium Muriate**—
Harburg, 152 t. Eglington Chm. Co.
**Pyrogallic Acid**—
Hamburg, 2 cs.
**Potassium Carbonate**—
Hamburg, 20 cks.
**Ultramarine**—
Rotterdam, 5 cks. J. Rankine & Son
" 10 "
**Waste Salt**—
Hamburg, 25 cks.
**Zinc Oxide**—
Antwerp, 35 cks.
New York, 100 brls.

## HULL.

*Week ending May 24th.*

**Brimstone**—
Catania, 32 cks. 1,814 bgs. Wilson, Sons & Co.
" 10 t.
**Barytes**—
Bremen, 20 cks. Blundell, Spence and Co.
" 75 bgs.
**Chemicals** *(otherwise undescribed)*
Rotterdam, 1 cs. W.&C.L.Ringrose
Trieste, 7 cks. Wilson, Sons & Co.
Stockholm, 4 cs. Cammell, Woolf and Haigh
Bremen, 3 cs. Veltmann & Co.
Antwerp, 22 pks. Wilson, Sons&Co
Hamburg, 149 "
Stettin, 20 cks. "
**Dyestuffs**—
**Shumac**
Trieste, 25 bls. 128 bgs. Wilson Sons & Co
" 600
**Argols**
Trieste, 18 cks. Wilson, Sons & Co.
**Alizarine**
Rotterdam, 40 cks. Hutchinson&Son
" 27 cks. W.&C.L.Ringrose
**Extracts**
Rouen, 16 cks. Rawson & Robinson
**Orchella**
Lisbon, 21 bgs. Bailey & Leetham
**Madder**
Rotterdam, 7 cks. W.&C.L.Ringrose
**Dyestuffs** *(otherwise undescribed)*
Antwerp, 1 brl. Wilson, Sons & Co.
**Indigo**
Antwerp, 1 pkg. Wilson, Sons & Co.
**Glucose**—
Hamburg, 40 bgs. Lawson & Sons
" 200 Hornstedt & Co.
" 10 cks.
Stettin, 100 bgs. 10 cks. Wilson, Sons & Co.
" 18 73 "
" 2,000 Lofthouse & Co.
Stettin, 115 cks.
**Manure**—
**Manure** *(otherwise undescribed)*
Hamburg, 200 bgs.
Ghent, 250 t. Wilson, Sons & Co.
Hamburg, 59 bgs. "
**Kainit**
Hamburg, 100 bgs. J. W. Hill
**Potash**—
Rotterdam, 4 cks.
" 21
**Saltpetre**—
Hamburg, 11 kgs. Wilson, Sons&Co.
" 4 cks. "
**Sulphur Ore**—
Huelva, 1,140 t. Dalton, Holmes&Co
**Sodium Silicate**—
Rotterdam, 50 cks. Lawson & Sons
**Tar**—
Stockholm, 10 brls. Wilson, Sons and Co.
**Tartaric Acid**—
Rotterdam, 12 cks. Hutchinson and Son
**Tartar Emetic**—
Rotterdam, 20 kgs. Hutchinson and Son

## TYNE.

*Week ending May 26th.*

**Acetic Acid**—
Rotterdam, 2 cks. Tyne S.S. Co.
**Glucose**—
Hamburg, 4 cks. Tyne S.S. Co.
**Nitre Cake**—
Harburg, 261 t.
" 575 Jarrow Chem. Co.
**Phosphate, Ground**—
Antwerp, 350 t.
**Soda**—
Rotterdam, 15 cks. Tyne S.S. Co.

## GOOLE.

*Week ending May 23rd.*

**Ammonia Sulphate**—
Rotterdam, 13 cks.
**Potassium Muriate**—
Hamburg, 21 pkgs.
**Potash**—
Calais, 40 dms.
" 15 cks.
**Soda**—
Rotterdam, 17 cks.
**Sodium Silicate**—
Hamburg, 13 brls.
**Saltpetre**—
Antwerp, 100 bgs.
Hamburg, 35
**Zinc Oxide**—
Antwerp, 10 brls.

## GRIMSBY.

*Week ending May 26th.*

**Chemicals** *(otherwise undescribed)*
Rotterdam, 10 cks.
Hamburg, 11
**Zinc Ashes**—
Antwerp, 19 cks.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 22nd.*

**Alumina Sulphate—**
Bordeaux, 7 t. 13 c. £25
**Alum Cake—**
Calcutta, 36 t. £113
**Alum—**
Sydney, 10 t. 5 c. £47
**Ammonia Carbonate—**
Bremen, 2 cks. £15
Hamburg, 29 pkgs. 70
**Arsenic—**
Melbourne, 2 t. 10 c. £30
Brisbane, 19 12
**Acetic Acid—**
Brisbane, 1 t. 17 c. £37
**Ammonia Sulphate—**
Rotterdam, 100 bgs. £120
St. Vincent, 75 t. 881
**Borax Refined—**
Melbourne, 10 kgs. £16
Brisbane, 10 c. 17
Keppel Bay, 1 t. 32
**Copper Sulphate—**
Buenos Ayres, 1 t. 10 c. & 18 cks. £140
Hobart, 1 t. 23
Sydney, 25 firkins 27
**Cream Tartar—**
Sydney, 1 t. 13 c. £200
Lyttleton, 1 tank 130
Hobart, 2 c. 5 cs. 62
Brisbane, 8 c. 50
Montreal, 4 cks. 136
Adelaide, 5 c. 30
Townsville, 5 c. 32
**Citric Acid—**
Genoa, 2 t. 9 c. £416
Batoum, 0 3 27
New York, 6 10 1,133
Barcelona, 4 cks. 171
**Chemicals** *(otherwise undescribed)*
Bombay, 16 c. £97
Oamaru, 36 pkgs. 89
Lyttleton, 20 cs. 31
Melbourne, 23 pks. 78
Dunedin, 10 cs. 70
Lisbon, 13 pkgs. 27
Naples, 10 cs. 200
**Copperas—**
Oporto, 27 t. 13 c. £44
**Camphor—**
Batoum, 2 cks. £62
Sydney, 1 cs. 19
**Caustic Soda—**
Lyttleton, 10 t. 15 c. £74
Napier, N. Z. 20 16 230
Newcastle, 5 4 65
**Carbolic Acid—**
Calcutta, 20 dms. £24
**Corrosive Sublimate—**
Shanghai, 2 cs. £25
Amsterdam, 7 c. 86
**Clarifiants—**
Bordeaux, 60 cks. £144
**Carbolic Acid Crystals—**
Genoa, 4 cks. £60
**Guano—**
Valencia, 800 bgs. £450
**Hydrocarbon—**
Brussels, 19 brls. £—
**Manure—**
Rotterdam, 7 t. 10 c. £65
St. Lucia, 20 146
Cherbourg, 150 450
Dominica, 45 450
Trinidad, 35 350
Antigua, 100 bgs. 6 tcs. 165
Barbadoes, 280 10 265
Cullera, 375 t. 3,187
Sables d'Olonne, 102 7 c. 767
Valencia, 350 0 2,450
Martinique, 330 0 990
Gothenburg, 148 5 452
Paris, 25 10 100
Neris, 29 cks. 178
Antwerp, 160 t. 0 c. 1,920
Huelva, 25 7 250
St. Nazaire, 25 11 100
**Potassium Chlorate—**
Batoum, 25 kgs. £66
Stettin, 2 t. 100
**Potassium Prussiate—**
Batoum, 1 ck. £18
**Phosphate of Lime—**
Lyttleton, 30 t. 5 c. £146
**Potassium Cyanide—**
Shanghai, 4 cs. £23
**Phosphorus—**
Melbourne, 4 cs. £37
Otago, 1 t. 240
**Sheep Dip—**
Melbourne, 200 dms. £126
Natal, 150 98
San Francisco, 9 t. 420
Calcutta, 275 dms. 120
**Sodium Nitrate—**
Martinique, 5 t. 5 c. £60
St. Kitts, 45 14 442
**Sulphuric Acid—**
Aden, 1 t. 10 c. £10
**Salammoniac—**
Buenos Ayres, 1 t. £23
Batoum, 2 cks. 17
Lisbon, 1 ck. 12
**Sulphur, Flowers—**
Lisbon, 605 bgs. £489
Melbourne, 2 t. 15
Oporto, 15 brls. 12
**Saltpetre—**
Venice, 2 t. 1 c. £42
Christiania, 0 10 12
Melbourne, 2 0 44
Sydney, 0 10 11
Oporto, 3 15 78
Brisbane, 0 10 11
**Sodium Silicate—**
Lyttleton, 5 t. 9 c. £33
Newcastle, 2 8 16
**Soda Crystals—**
Cleveland Bay, 5 t. 2 c. £13
Sydney, 32 10 81
**Sulphur—**
Brisbane, 20 cks. £28
**Saccharine—**
Charente, 2 cs. £70
**Soda Ash—**
Buenos Ayres, 29 t. £107
**Sodium Tartrate—**
Melbourne, 5 c. £26
**Superphosphate—**
Charente, 30 t. 17 c. £93
**Tartaric Acid—**
Hobart, 0 t. 3 c. £27
Sydney, 1 3 181
Brisbane, 5 cs. 42
Adelaide, 10 c. 82

## LIVERPOOL.

*Week ending May 23rd.*

**Arsenic Acid—**
New York, 1 t. 12 c. £27
**Alum—**
Carril, 2 t. 3 c. £10
Malta, 4 15 23
Malaga, 19 2 107
Buenos Ayres, 8 9 42
Kurrachee, 25 6 144
Bombay, 13 11 68
Santander, 6 1 29
Salonica, 1 9 7
Barcelona, 3 3 18
St. John's, N.B., 5 4 33
Capetown, 2 0 12
Seville, 12 16 3 q. 61
London (Ontario) 3 12 22
Montreal, 3 12 18
**Aluminous Cake—**
Gothenburg, 5 t. 6 c. £17
Demerara, 6 3 18
**Ammonia Sulphate—**
Barcelona, 10 t. 10 c. 1 q. £320
Valencia, 100 4 1,158
Teneriffe, 5 3 59
Barbadoes, 50 562
Shanghai, 1 0 1 12
Nantes, 25 260
**Arsenic—**
Rio de Janiero, 3 t. 1 c. £38
**Ammonia Carbonate—**
Oporto, 5 c. 2 q. £10
Genoa, 1 t. 12 3 61
Venice, 5 2 10
**Acid** *(otherwise undescribed)—*
Quayaquil, 2 bs. £10
**Ammonia Liquid—**
Guayaquil, 2 c. £5
**Brimstone—**
Boston, 10 t. 1 c. £56
Calcutta, 12 6 62
Para, 0 11 2 q. 5
**Borax—**
New York, 14 t. 7 c. £450
Constantinople, 7 10
**Bauxite—**
Philadelphia, 3 t. 10 c. £5
**Barytes—**
Halifax, 5 t. 4 c. £20
**Bleaching Powder—**
Ancona, 15 brls.
Antwerp, 27 cks.
Baltimore, 93
Boston, 724
Genoa, 22 tcs. 111
Havana, 8
Leghorn, 15
Malaga, 10 brls.
Montreal, 186 tcs.
Naples, 76 cks.
Oporto, 22 brls.
Piræus, 14 cks.
Rouen, 60
Venice, 15 brls.
Vera Cruz, 10
Vigo, 6
**Chemicals** *(otherwise undescribed)*
Genoa, 1 t. £49
Hamburg, 1 11 c. 2 q. 47
Havre, 5 150
Naples, 0 15 22
Buenos Ayres 5 150
Stettin, 100 10 1 772
Alexandria, 0 10 1 16
**Carbolic Acid—**
Genoa, 1 t. 14 c. 1 q. £222
Hamburg, 1 9 197
New York, 2 10 303
Alexandria, 0 14 15
Boston, 1 10 142
**Cream Tartar—**
Miramichi, 1 c. £7
**Copper Sulphate—**
Malaga, 0 t. 4 c. £5
Venice, 2 43
Bordeaux, 100 6 1 q. 1,730
Algoa Bay, 0 9 11
Ghent, 2 0 3 42
**Carbon—**
Barcelona, 1 c. 1 q. £7
**Chromic Acid—**
Antwerp, 1 ck. £15
**Collodion—**
Shanghai, 7 bs. £93
**Copperas—**
Galatz, 11 t. 4 c. 1 q. £20
San Francisco, 1 3
Montreal, 2 8 5
**Caustic Potash—**
Venice, 0 t. 2 c. 1 q. £5
New York, 9 10 190
**Charcoal Refuse—**
Hamburg, 10 t. 2 c. 2 q. £40
**Caustic Soda—**
Adelaide, 225 dms.
Alexandria, 3 brls.
Algiers, 25
Antwerp, 53
Barcelona, 130 brls. 140
Bari 74
Bombay, 21
Bordeaux, 100
Boston, 200
Brisbane, 68
Carthagena, 16
Cienfuegos, 20
Fiume, 20
Genoa, 170
Hamburg, 12 cks. 126
Hiogo, 150
Ibrail, 10
Kurrachee, 25
Leghorn, 115
**Caustic Soda—***continued.*
Lisbon, 43 dmns.
Maceio, 4
Madeira, 10
Malta, 5
Manila, 150
Mayaguez, 6
Melbourne, 207
Memphis, 50
Monte Video, 390
Montreal, 100
Nantes, 33
Naples, 20
Newfairwater, 86
New York, 646
Odessa, 200
Oran, 18
Passages, 50
Pernambuco, 95
Philadelphia, 100 brls. 150
Rotterdam, 46
Rouen, 170
St. Petersburg, 8,240
San Francisco, 30
San Sebastian, 80
Stettin, 102
Stockholm, 5
Sydney, 72
Terneuzen, 36
Trieste, 10
Valparaiso, 62
Venice, 15
Vera Cruz, 37
**Disinfectants—**
New York, 0 t. 9 c. £31
Algoa Bay, 2 8 2 q. 17
Calcutta, 5 16 140
**Epsom Salts—**
Leghorn, 19 tcs.
**Glycerine—**
Oporto, 5 c. £19
**Iron Oxide—**
Antwerp, 1 t. 15 c. £7
**Leather Waste—**
Havre, 1 t. 6 c. £14
**Manure—**
Barbadoes, 50 t. £350
Grand Canary, 13 16 c. 91
**Magnesia—**
Vera Cruz, 9 cs.
**Oxalic Acid—**
Melbourne, 1 t. £30
**Picric Crystals—**
Hamburg, 2 t. 13 c. £144
**Potassium Chlorate—**
Colon, 0 t. 10 c. 2 q. £31
Oporto, 0 10 26
Rotterdam, 6 306
Calcutta, 0 4 12
Gothenburg, 2 10 134
New York, 19 968
Philadelphia, 2 10 78
Corunna, 0 4 12
**Potashes—**
Melbourne, 2 t. 16 c. 2 q. £68
Rosario, 0 4 6
Palermo, 2 16 65
**Phosphorus—**
Vera Cruz, 1 t. 15 c. 1 q. £320
**Potassium Bichromate—**
Rio de Janeiro, 12 c. £26
Oporto, 16 1 q. 31
**Precipitated Chalk—**
New York, 2 t. 12 c. 1 q. £40
**Potassium Bicarbonate—**
New York, 0 t. 11 c. 2 q. £75
Leghorn, 1 3 87
**Potassium Carbonate—**
Boston, 10 t. 6 c. £200
**Potassium Stannate—**
Bombay, 1 t. 11 c. £127
**Pitch—**
Bordeaux, 601 t.
Carril, 50 brls.
Cette, 846 t.
**Sodium Nitrate—**
New York, 0 t. 18 c. 1 q. £22
Carthagena, 6 11 2 55
Bari, 1 5 2 12
**Sulphur—**
Demerara, 8 t. 3 c. 1 q. £43
Iquique, 26 4 1 253
Tabasco, 0 17 3 9
Pernambuco, 1 2 7
**Soap Extract—**
Alexandria, 5 c. 2 q. £7

**oniac—**
0 t. 16 c. £28
m, 0 11 3 q. 19
0 5 1 9
2 1 71
0 8 14
0 9 2 21

**re—**
2 t. 5 c. £48
3 6 2 q. 70
1 2 3 33
2 11 2 57
cisco,1 2 2 25
0 11 2 13

**ic Acid—**
10 c. £9
ria, 14 2 q. 16

**e—**
e, 146 t. 10 c. £265

**Dip—**
, 4 c. 2 q. £7

**, Flowers—**
1 t. 9 c. 2 q. £13

**Stannate—**
5 c. 1 q. £17
,10 41

**f Lead—**
, 2 t. 7 c. 2 q. £62
urg, 0 9 14

**Carbonate—**
11 c. £14

500 t.
, 541
el, 120
re, 650
400
, 143
Ayres, 35
, 8,750
ons, 117
, 30
agen, 20
rg, 475
155
1,156
242
polis, 80
300
30
470
chi, 186
Video, 26
rk, 110
abar, 96
am, 116
10
, N.B., 8
dm, 246
, 650

**sh—**
re, 349 cks. 1,043 tcs.
na, 25 pkgs. 2
o brls.
500 bgs. 176 cks. 562 tcs.
e, 67
Ayres, 270 brls.
ena, 52
2 cks.
27
t, 421
rne, 35 33 tcs.
rk, 211 tcs. 258 cks.
18
8 brls. 10
10
8
lphia, 1,027 tcs. 268 cks.
negre, 60 brls.
, 89 tcs.
eiro, 160 brls. 10 cks.
6

**a Bicarbonate—**
e, 110 kgs.
na, 100
, 60
e, 530
Ayres, 20 cks.
ntinople,40 kgs.
30 cks. 50
, 220
rg, 2 cks, 164 brls. 30 kgs.
n, 5 cks. 50 kgs.
ez, 4
chi, 25
al, 250
, 20
, 150 20 cks.
lam, 60 4
n, N.B., 100
85
a, 30
, 209 brls.
, 140
la, 112
ma, 1,200

**Sodium Silicate—**
Ibrail, 12 brls.
Syra, 30 cks.
Brisbane, 8 brls.
Galatz, 19 cks.
Melbourne, 40
Salonica, 6
Seville 16

**Soda Crystals—**
Boston, 280 brls.
Brisbane, 184 kgs.
Calcutta, 15 7
Lisbon, 35
Philadelphia, 284 50 cks.
Singapore, 10
Halifax, 100 kgs.
New York, 50 cks.

**Tartaric Acid—**
Arica, 3 q. £8

**Tin Crystals—**
Montreal, 10 c. 1 q. £35

**Tin Oxide—**
Gothenburg, 1 c. 1 q. £8

**Tar—**
Cabenda, 6 cks.

**Verdigris—**
Rio de Janeiro, 5 c. £30

## GLASGOW.

*Week ending May 26th.*

[NOTE.—For Week ending May 12 in last week's issue, *read* May 19.]

**Ammonia Sulphate—**
Antigua, 62 t. £918
Trinidad, 19 7 c. 230
Demerara,65 8 1 q. 744

**Arseniate of Soda—**
Lisbon, 1 t. 15 c. £24

**Ammonia—**
Monte Video, 1 t. 18 c. £42

**Boracic Acid—**
New York, 2 t. 2 c. 3 q. £86

**Chemical Apparatus—**
Huelva, 1 c. £5

**Chemicals** *(otherwise undescribed)*
Trinidad, 126 t. 10 c. 3 q. £1,250

**Cream Tartar—**
Brisbane, 10 cs. £72

**Dyestuffs—**
Lisbon, 2 t. 18 c. 2 q. £110
**Alizarine Oleine**
Lisbon, 2 t. 10 c. £40

**Manure—**
**Manure** *(otherwise undescribed)*
Antigua, 10 t. £100
Trinidad, 159 7 c. 1662
Demerara, 124 12 1386
**Dissolved Bones**
Antigua, 11 t. 19 c. 2 q. £63
Demerara, 8 19 34
**Bone Meal**
Antigua, 5 t. 29
**Superphosphate**
Trinidad, 23 t. £65
**Dissolved Guano**
Demerara, 15 t. £165

**Nitric Acid—**
Rangoon, 3 c. £22

**Oxide of Manganese—**
New York, 10 t. 3 c. £77

**Potassium Muriate—**
Antigua, 3 t. 17 c. £28
Demerara, 4 17 2 q. 35

**Paraffin Wax—**
Gothenburg, 8 t. 8 c. £105

**Paraffin Scale—**
Christiania, 1 brl. £4

**Potassium Bichromate—**
Antwerp, 1 t. 5 c. £37
Bombay, 3 0 120

**Potassium Carbonate—**
Bombay, 3 t. 17 c. 2 q. £66

**Potassium Prussiate—**
New York, 1 t. 14 c. 1 q. £98
Christiania, 1 ck. 33

**Pitch—**
Dieppe, 520 t.

**Sulphuric Acid—**
Rangoon, 3 t. 10 c. £38
Kurrachee, 18 11 119

**Saltpetre—**
Quebec, 4 t. 6 c. 3 q. £92

**Sodium Bichromate—**
Bombay, 1 t. £31

**Sugar of Lead—**
Bombay, 4 t. 1 c. 2 q. £78

**Tar—**
Colombo, 70 runlets £24

**Tartaric Acid—**
Brisbane, 10 cs. £91

## HULL.

*Week ending May 22nd.*

**Ammonia Sulphate—**
Hamburg, 202 t.
Antwerp, 203
Ghent, 25
Stettin, 25
Gothenburg, 5

**Bone Size—**
Harlingen, 14 cks.

**Chemicals** *(otherwise undescribed)*
Amsterdam, 6 cs. 13 cks.
Bergen, 87
Bombay, 274
Bremen, 20 pks. 26
Christiania, 3 47
Copenhagen, 115
Dunkirk, 39
Drontheim, 30 20
Gothenburg, 54 6 cs. 680 slabs.
Hamburg, 12 14 19 cks.
Helsingfors, 53
Konigsberg, 20 4
Riga, 34
Rotterdam, 31 cs. 30 cks. 45 pkgs
St. Petersburg, 200
Stettin, 2

**Caustic Soda—**
Bergen, 2 dms.
Christiania, 30
Helsingfors, 5
Libau, 19
Riga, 374
Rotterdam, 37
Reval, 50 cks.
St. Petersburg, 33

**Dyestuffs—**
Hamburg, 1 ck.
Rouen, 2
Rotterdam, 6 2 cs.
Reval, 3
Stettin, 116 bgs.

**Manure—**
Antwerp, 178 bgs.
Guernsey, 2,322
Ghent, 224
Gothenburg, 87
Hamburg, 1,535
Rotterdam, 88

**Pitch—**
Antwerp, 96 t.

**Salt—**
Copenhagen, 5 t.

**Tar—**
Amsterdam, 12 cks.
Bergen, 3
Christiania, 10 brls.
Copenhagen, 10 cks.
Rotterdam, 6
Stettin, 2
Stockholm, 1

**Turpentine—**
Bergen, 1 ck.
Drontheim, 2

## TYNE.

*Week ending May 26th.*

**Ammonia—**
Ergastiria, 2 c. 2 q.

**Alkali—**
St. Petersburg, 54 t. 15 c. 2 q.
Helsingfors, 7 5 2
Antwerp, 5 5 2
Hamburg, 11 1
Montreal, 30 7 2
Rotterdam, 9 10 3

**Antichlor—**
Stockholm, 8 c.

**Alumina—**
Antwerp, 20 t. 5 c.
Montreal, 15 6 2 q.

**Aluminous Cake—**
Odense, 6 t. 15 c. 2 q.
Montreal, 25 10
Rotterdam, 3 0 2

**Antimony—**
Montreal, 7 t. 2 c.

**Barium Chloride—**
Malmo, 19 c. 1 q.

**Bleaching Powder—**
Copenhagen, 32 t. 14 c.
St. Petersburg, 59 18 1 q
Helsingfors 14 7
Stockholm 2 1 2
New Fairwater, 9 19
Antwerp, 14 4 1
Hamburg, 130 18 2
Horsens, 1 5
Rotterdam, 20 3

**Barytes Carbonate—**
Hamburg, 11 t.

**Caustic Soda—**
Copenhagen, 2 t.
Helsingfors, 1 4 c
Stockholm, 5 8 3 q.
Valparaiso, 1 6
Antwerp, 5 2
Malmo, 2 18
Horsens, 1 8

**Disinfectant—**
Valparaiso, 1 t. 1 c.

**Hydrochloric Acid—**
Ergastiria, 4 c. 2 q.

**Litharge—**
Copenhagen, 1 t. 6 c. 3 q.
Hamburg, 1 7 1
Rotterdam, 11 1

**Magnesia—**
Antwerp, 2 c.
Odense, 1
Hamburg, 1 3 q.
Rotterdam, 2

**Nitric Acid—**
Ergastiria, 12½ lb.

**Pitch—**
Helsingfors, 6 t. 12 c.
Montreal, 75

**Potassium Chlorate—**
Antwerp, 2 t.
Malmo, 3 5 c.
Hamburg, 5 2 q.

**Sodium Bicarbonate—**
Copenhagen, 1 t. 7 c.
Hamburg, 1 10

**Sodium Sulphate—**
Copenhagen, 9 t. 14 c. 3 q.
Randers, 6 12 3

**Soda—**
Helsingfors, 5 t. 13 c. 1 q.
Stockholm, 256 11 1
Odense, 34 6
Hamburg, 10 1
Montreal, 105
Randers, 10 13 1
Rotterdam, 59 19 2

**Soda Ash—**
Helsingfors, 62 t. 3 c. 2 q.
Stockholm, 42
Halmstad, 12 17 2
Hamburg, 12 2
Montreal, 1 4 2
Horsens, 73 8 3
Rotterdam, 20 2

**Sodium Nitrate—**
Helsingfors, 2 t. 1 c. 2 q.

**Superphosphate—**
Esbjerg, 5 t. 18 c.
Horsens, 20

**Tar Refuse—**
Copenhagen, 2 t. 6 c.

**Tar—**
Helsingfors, 11 t.
Malmo, 10

## GOOLE.

*Week ending May 23rd.*

**Benzol—**
Antwerp, 25 cks.

**Bleaching Powder—**
Ghent, 21 cks.

**Chemicals** *(otherwise undescribed)*
Calais 30 cks.
Hamburg, 1 cs.
,, 27 cks.
Rotterdam, 25
Rouen, 10

**Coal Products—**
Dunkirk, 50 cks.

**Manure—**
Antwerp, 471 bgs.

## GRIMSBY.

*Week ending May 26th.*

**Chemicals** *otherwise undescribed*
Antwerp, 7 cks.
Dieppe, 40 bottles
Rotterdam, 1 ck.

# PRICES CURRENT.

[THURSDAY, May 31, 1888

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids:—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 8 | 3 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 12 | 6 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 3¾ |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2½ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3 |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (monohydrate) | ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6 |
| Arsenic, white powdered | per ton | 11 | 15 | 0 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880 = 28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 21 | 10 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 42 | 10 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 11 | 15 | 0 |
| ,, ,, (grey), Hull | ,, | 11 | 15 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8¼ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 5 | 0 |
| ,, Carbonate (native) | ,, | 5 | 0 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 11 | 10 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 2 | 9 |
| ,, 50/90 ,, | ,, | 0 | 2 | 4 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2 |
| ,, (crude 60°) | per gallon | 0 | 3 | 11 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 2 |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 0 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 13 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 81 | 0 | 0 |
| ,, Sulphate | ,, | 21 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 75 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 2 | 0 | 0 |
| Lead (sheet) for cash | ,, | 13 | 15 | 0 |
| ,, Litharge Flake (ex ship) | ,, | 15 | 0 | 0 |
| ,, Acetate (white, ,, ) | ,, | 25 | 10 | 0 |
| ,, ,, (brown, ,, ) | ,, | 20 | 15 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 10 | 0 |
| ,, Nitrate | ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 8 | 0 | 0 |
| ,, ,, (grey) | ,, | 12 | 5 | 0 |

| | | £ | s. | d |
|---|---|---|---|---|
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | |
| ,, Chloride | per ton | 2 | 7 | |
| ,, Carbonate | per cwt. | 1 | 17 | |
| ,, Hydrate | per cwt. | 0 | 10 | |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | |
| Manganese, Sulphate | ,, | 17 | 10 | |
| ,, Borate | per cwt. | 2 | 2 | |
| ,, Ore, 70 % | per ton | 2 | 12 | |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | |
| Naphtha (Wood), Solvent | ,, | 0 | 3 | 1 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 5 | |
| **Oils:—** | | | | |
| Castor | per cwt. | 1 | 3 | |
| Cotton-seed | per ton | 22 | 0 | |
| Linseed | ,, | 19 | 10 | |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | |
| Petroleum, Russian | per gallon | 0 | 0 | |
| ,, American | ,, | 0 | 0 | |
| Potassium (metal) | per oz. | 0 | 3 | |
| ,, Bichromate | per lb. | 0 | 0 | |
| ,, Carbonate, 90 % | per ton | 16 | 7 | |
| ,, Chlorate | per lb. | 0 | 0 | |
| ,, Cyanide, 98 % | ,, | 0 | 1 | |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 0 | |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 7 | |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | |
| ,, Permanganate | ,, | 4 | 5 | |
| ,, Prussiate Yellow | per lb. | 0 | 0 | |
| ,, Sulphate, 90 % | per ton | 10 | 10 | |
| ,, Muriate, 80 % | ,, | 7 | 15 | |
| Silver (metal) | per oz. | 0 | 3 | |
| ,, Nitrate | ,, | 0 | 2 | |
| Sodium (metal) | per lb. | 0 | 6 | |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 15 | |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 12 | |
| ,, ,, (Soda Crystals) | ,, | 2 | 8 | |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | |
| ,, Acetate (ex ship) | ,, | 19 | 10 | |
| ,, Chlorate | per lb. | 0 | 0 | |
| ,, Borate (Borax) | per ton. | 30 | 0 | |
| ,, Bichromate | per lb. | 0 | 0 | |
| ,, Hydrate (77 % Caustic Soda) | per ton | 7 | 15 | |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 3 | |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 12 | |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 12 | |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 11 | |
| ,, Bicarbonate | ,, | 5 | 0 | |
| ,, Hyposulphite | ,, | 5 | 10 | |
| ,, Manganate, | ,, | 6 | 15 | |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | |
| ,, Nitrite, 98% | per ton | 28 | 0 | |
| ,, Phosphate | ,, | 16 | 10 | |
| ,, Prussiate | per lb. | 0 | 0 | |
| ,, Silicate (glass) | per ton | 5 | 10 | |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 5 | |
| ,, Sulphate (Salt-cake) | ,, | 1 | 5 | |
| ,, ,, (Glauber's Salts) | ,, | 1 | 10 | |
| ,, Sulphide | ,, | 8 | 15 | |
| ,, Sulphite | ,, | 5 | 2 | |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | |
| Sugar, Beet | per cwt. | 0 | 13 | |
| ,, Cane | ,, | 0 | 16 | |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | |
| ,, Barium | ,, | 0 | 0 | |
| ,, Copper, 60% | ,, | 0 | 0 | |
| Sulphur (Flowers) | per ton | 8 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). | ,, | 4 | 1 | 3 |
| Superphosphate of Lime (28 %) | ,, | 2 | 5 | 0 |
| Tallow | ,, | 26 | 0 | 0 |
| Tin (metal) | ,, | 85 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | |
| Zinc (Spelter) | per ton | 16 | 10 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 5 | 0 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, June 9, 1888.**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## Notices.

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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

Advertisements intended for insertion in the current week's issue, should reach the office by **Wednesday morning** at the latest.

## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application

## BLEACHING BY ELECTRICITY.

JUDGING from the letters which have appeared in our columns, a great amount of interest seems to be displayed in the new Hermite process of bleaching. On the one hand we have the promoters of the process coming forward with a full account of many experiments which have been made with a view to prove the process a commercial success, while, on the other hand, those interested in maintaining the present market for ordinary bleachin powder are endeavouring to show that the figures given as the results of the Hermite process are far too favourable, and that as the last numbers, the results of work on a large scale, do not agree with the former, that none of them are trustworthy, and all of them therefore unreliable.

It is not our function to side with either of the disputants; it is our duty to lay before our readers a fair and unvarnished statement of matters as they stand, and to leave the rest to be settled by experiment on the large scale. The tone of the letters in our last issue seemed to us not calculated in any great degree to impress the reader with a desire to look at the subject from a practical standpoint, and many might easily be tempted to infer that the readers of the paper in London in April last were charged with wilfully fabricating numbers in order to prove their case. We do not think this was intended by the correspondents whose letters appeared in last week's issue, but as it has been pointed out by several of our readers we feel bound to mention it here. We shall look forward with great interest to the result of Dr. Hurter's experiments as appertaining to the theoretical considerations of the case, but at the same time we shall certainly lay more weight upon the results of those practical trials which we believe are now being carried out in several important works. And for this reason, that in our opinion it is by no means settled what takes place in the operation of bleaching fibres; it may be that in bleaching by the ordinary process much chlorine is wasted, while the new process effects the operation with greater economy of substance. Anyhow, as we look at the problem, Messrs. Cross and Bevan have advanced certain figures, and it seems to us that it is the duty of dissentients to prove their figures incorrect, if they are able to do so.

Respecting the letter of our correspondent W. M., we do not lay so much stress upon the differences which exist in the two sets of experiments as he does. Interpretations of the results of all processes carried on on a manufacturing scale, must be made not only with intelligence but with due regard to the conditions surrounding the trials, and as these conditions are liable to serious modification without all the quantities are known, it is impossible to say that any given report does not deserve credence. It would have surprised us, certainly, had the figures of Messrs. Cross and Bevan's second series of trials come out identical with the first, seeing that the first experiments were made on a few grammes in the laboratory, while the second were large scale trials. In the current efficiency their laboratory experiments were certainly faulty, but we think this is all that can be said against them. This has been rectified by the results given of the large scale experiments, and though, as Dr. Hurter has pointed out, two of the principal items are estimates, we believe anyone who has had experience with steam engines will admit that one halfpenny per indicated horse-power per hour is quite sufficient to allow for a well-ordered plant, while electricians will no doubt smile upon us if we were to presume that an efficiency of 72·8 per cent. was impossible.

As we have already pointed out, in order to make the process a success the secondary decompositions must be

suppressed, and if Messrs. Cross and Bevan's results are to be believed—and they at least bear the impress of truth—this has been attained. Another point to be well considered, practically, is the relative bleaching efficiency of the Hermite solution and the old bleach, upon which the success of the process depends. We have seen no attempt to prove that the Hermite solution is not much superior to the old solution of bleaching powder, and until this is done by reference to experiments made on the large scale, we must retain our opinions as to the reliability of the experiments, the more especially as we have had several conversations with paper-makers who have had samples bleached by the new process, and who have declared that in looking at them their excellence led them to believe they were in possession of a new material.

## CHEMICAL ENGINEERING.*

IV.

I CANNOT close the subject of technical work in the laboratory without making a few remarks upon the general mode of testing and examining the products in course of manufacture, and also the means employed in making the physical measurements which have to be recorded from time to time. I am well aware that the former subject does not strictly come under the head of chemical engineering, except in a very indirect manner; but I think no one will attempt to gainsay the fact that much money has been lost owing to imperfect methods of taking samples, and that the blame of bad working has often been laid on the wrong shoulders. The sampling of technical products certainly requires much more care than is generally bestowed on the operation, and specialists know this full well. I can perhaps illustrate the subject by a reference to the black-ash operation of the old Leblanc process. In some works a sample of each ball used to be taken as it was drawn from the furnace; in another the work was sampled on the ball-bank, while in a third, the balls were sampled as the vats were being filled. Then, again, it was by no means a settled question how the sample should be taken: some insisted on its being taken from the outside of the ball, while others went right to the centre for the fair and average sample. A consideration of the *rationale* of the operation of black-ash making, and in fact all other operations of a similar character, will show us how extremely difficult it must be to take a fair average sample. The reaction between the raw materials takes place at the moment of igneous fusion, and the charge cannot be kept in the furnace until the changes are absolutely complete, for the simple reason that the mass would become too fluid, and when cold too hard to lixiviate. If a sample be taken as it is being drawn into the bogie the undecomposed sulphate of soda will be found high, and the same may be said of the sample taken from the outside of the ball, for the simple reason that the iron bogie has cooled down the fused mass and stopped the reaction from proceeding. On the other hand, underneath the solidified surfaces the reaction has gone on for some time, and here the decomposition has been best effected. I have always objected to hampering the laboratory with useless work, and the testing of black-ash as ordinarily performed is in my opinion a waste of time and money. But, some may say it keeps the men to their work; we pay a premium on all good work and how could we allot that premium without examining the balls? The reply is: Examine the liquor from the vats instead more carefully than is done at present, by this means a fair average of a large number of balls will be obtained, and the character of the saltcake can also be ascertained from the same source. As a check upon the saltcake tests, the vat liquor should be reconverted into saltcake by careful neutralisation with sulphuric acid, calcined, and examined for chlorides.

The late Mr. Balmain, well-known as a technical chemist of great ability, never put much faith in the testing of small samples of technical products. His plan, and not a bad one by any means, was to stir up several pounds of the substance in a bucket of water till all was dissolved, and to make the solution correspond to some premeditated gravity—it was this solution which was carefully examined.

I do not wish to dilate upon the many and various chemical methods employed in the examination of technical products; but I would like to say that results would be often far more useful if stated in chemical equivalents than in percentage numbers, and a much greater insight into the working of many processes thereby obtained, to say nothing of the economies which might thus be introduced. To take, for instance, the causticising of soda-ash solution with lime, every equivalent of carbonic acid present requires at least one equivalent of lime theoretically, practically more; yet I will venture to say that there is not one caustic works in the whole country that has a permanent record of the tests made to ascertain the relative equivalents in each causticising operation. In order to have something to go upon for this lecture, I have obtained a sample of a finished operation from a well-known caustic soda works, and I find that 1·54 equivalents of lime had been used to produce a causticisation of 87 per cent., while from a paper mill where things are carried out very well, 1·18 equivalents of lime produce a causticisation of 96 per cent. In another caustic soda works, wherein a high causticisation could never be obtained, I found that only 0·98 equivalents of lime were being used, which accounted for the bad working at once without searching deeper.

In the manufacture of sulphate of ammonia from gas water the waste of lime is almost incredible; in some works 12 to 14 equivalents are employed to drive off one equivalent of fixed ammonia, while in others less than two equivalents suffice. It is on this account that some works have found it as cheap to use caustic soda for this purpose instead of lime, and being a dearer article they have been more sparing with it.

I may now pass on to the physical measurements usually demanded from a laboratory.

First, the taking of specific gravities. The specific gravity glass or hydrometer is perhaps accurate enough for use in the works, where one cannot exercise as much care with temperatures as in the laboratory, but the arbitrary scales of Beaumé and Twaddell should now be no longer tolerated. I believe in the plan of direct weighing, either by means of the Westphal balance, where a known weight of glass is immersed in the fluid to be examined, or by means of taking the weight of a known bulk of the liquid. A tared or counterpoised 100 c.c. flask makes a very good specific gravity bottle, and is exceedingly handy withal.

The method of taking the specific gravity of solid bodies does not require special description, without it be to warn the student not to employ a liquid having the slightest solvent action upon the solid body. The following determination of the specific gravity of high strength caustic soda will serve to show how the specific gravity of substances soluble in water is arrived at:—

Weight of caustic soda in air ..... 11·070 grammes.
" petroleum 7·187 "
Sp. gr. of the petroleum ..... 0·7076 "
Sp. gr. of the caustic soda was 2·02, or 126lb to the cubic foot

$$\text{Thus: } \frac{11{\cdot}07 \times {\cdot}7076}{(11{\cdot}070 - 7{\cdot}187.)} = 2{\cdot}02$$

The test of boiling point is not infrequently applied to chemical substances, and special care must be taken to ensure accuracy of the thermometer. It is a well known fact that after having been in use for a time some thermometers go wrong in their indications, and not a few disputes in the tar products trade have arisen from this cause. Thermometers in constant use should be occasionally verified for the boiling point of water and the melting of ice, under the normal barometric pressure.

Heat measurers or pyrometers for use in the works, of a reliable character are still *desiderata*, the best in my opinion are Schäffer and Budenberg's Thalpotassimeters, which I have used on several occasions for long periods, and with very satisfactory results. Murrie's pyrometer, which is really a pressure gauge graduated for temperatures instead of pressures, has also been recommended for works use. Ordinary rod pyrometers depending upon the differential expansion of solids are of but little practical value, as anyone who has used them for a time will be able to corroborate, still they are made, and no doubt serve some useful purpose. For ordinary degrees of heat, say from a black red to 600° C., a practised eye becomes very sensitive, and in many instances I have known the pyrometers much less trustworthy than the foreman's eye. It is for temperatures commencing at 600° C. and reaching the melting point of steel that pyro-

* A course of lectures delivered by Mr. George E. Davis at the Manchester Technical School.—*All rights reserved.*

meters are sorely wanted, and here a field is open to inventors. Siemens' electrical pyrometer is perhaps the most scientific apparatus for measuring high temperatures, but those who have used it will, I am sure agree with me in saying that it is hardly a technical heat-measurer. Siemens' copper ball pyrometer deserves special notice, as though it has several defects, it is one of the most useful technical heat measurers we have. It consists of a double-cased vessel of copper with an intermediate packing of felt, and is of sufficient size to hold rather more than a pint of water. As ordinarily constructed a scale is attached to the instrument, so that the temperature can be read off direct, but this is by no means necessary. I have used for years an ordinary vessel of copper, jacketed with felt to prevent loss by radiation, using a varying weight of metal and a varying supply of water. The following estimates of high temperatures will illustrate the subject sufficiently:—

**Determination of the Temperature of the Gases in an Open Saltcake Roaster.**

Weight of copper employed ..... 98·05 grammes.
Water employed (98·05 × 4·253) ... 416 c.c.

The copper ball was allowed to be in the heat of the furnace for ten minutes, then rapidly withdrawn and plunged into the water.

Temperature of water before experiment... 69·5° F.
" " after " ... 88·5° F.

Difference ..... 19°

and (19 × 50) + 69·5° = 1019° F.

In order to ascertain how near several experiments would come to each other when using this pyrometer, I took the temperatures of two black-ash balls just drawn into the bogie. The copper balls were placed in an iron tube closed at one end and pushed into the fused ball. No. 1 was a good stiff ball, No. 2 was a very thin ball, of which the analysis afterwards showed an excess of saltcake.

| | No. 1. | No. 2. |
|---|---|---|
| First experiment ..... | 1660° F. ..... | 1064° |
| Second " ..... | 1623° F. ..... | 1086° |
| Third " ..... | 1632° F. ..... | 1080° |

The taking of melting points of tallow, greases of various kinds, and even such operations as the twisting point of coal-tar pitch should be done more carefully in technical laboratories than is usually the case. In the patent fuel districts of France, Belgium, and Germany a special but very neat apparatus is employed for the testing of pitch, which is quite unknown to the majority of coal-tar distillers in this country, who simply chew the sample in order to judge of its quality.

Some articles, such as for instance crude carbolic acid, are bought and sold by the percentage crystallising, at say 60° F. (15·5° c.) The distillate is cooled in winter by a current of cold water from the water-main, but in summer the temperature of the water supply precludes this being done. Here the use of freezing mixtures comes in, and the following will be found very useful:—

| | | Will depress the temperature to |
|---|---|---|
| Snow | 100 grms. | |
| Common salt | 100 " | ..... 18° C. |
| Crystallised sodium sulphate | 80 " | |
| Hydrochloric acid, sp. gr. 1·16 | 50 " | ..... 18° C. |
| Snow previously cooled to 18° C. | 100 " | |
| Crystallised calcium chloride, cooled to 18° C. | 200 " | ..... 50° C. |

Before leaving the subject of technical analysis, I would fain say a few words upon the analysis of trade products in general. In dealing with commercial articles, the raw materials of certain trades, it is well known that different methods of analysis yield very varying results. As an outcome of this there have risen up what have been termed "high analysts" and "low analysts," and over and over again it has been stated that some merchants have adopted the plan of buying by the "low analyst" and selling by the "high," thus making a very handsome profit by the transaction. It may be argued that this is not fair to the manufacturer who uses the article; still the purchaser is not forced to buy upon an incorrect or unsatisfactory test, and it is he who is in duty bound to expose any incorrectness. This was done some years ago with reference to manganese assays, but there are several things yet that require putting upon a proper footing. The analytical method employed for the valuation of raw material should as far as possible follow the lines taken in the manufacture, and the chemist should be very careful not to specify that a sample contains such or such a percentage of any substance without he is certain that the substance mentioned in the given proportion is in a state of absolute purity.

Chemical engineering can never help a man who pays for a larger quantity of any article than he receives, and neither will the science enable him to recover a greater weight of any substance than there happens to be theoretically in his raw material. The technical experiment should help to settle the mode in which the assay or analysis for valuation purposes should be conducted, and when once settled it should not be departed from, except for special commercial reasons.

I can explain what I mean perhaps better by reference to some special example. There is a product well known to some vitriol makers as the spent oxide of the gasworks. This is the oxide of iron which has become saturated with sulphur from the sulphuretted hydrogen of the coal-gas with which it has been brought in contact. When it has become charged with sulphur it is useless for further purification and has to be disposed of. It is bought by vitriol makers, who burn it in special kilns, and carry the sulphurous acid gas into the ordinary leaden chambers. Now there have been several methods employed for assaying this product. In the first instance, the total sulphur was oxidised to sulphuric acid, and this being precipitated with a soluble barium salt was weighed as sulphate of barium, and from it the sulphur was calculated. This method, though it gave much more sulphur than actually existed in the material, was employed for many years, until some unlucky wight discovered that sulphate of lime was sometimes present, and often too sulphocyanides in no small quantity. A method was then devised of dissolving out the sulphur with carbon disulphide and regaining the sulphur from the solution. This method is the commercial method of the present day, but I have on two different occasions publicly exposed its inaccuracy as a method for valuation purposes. The spent material contains varying proportions of carbonate of lime, naturally or perhaps added at the gasworks to assist in the purification, and every equivalent of this carbonate of lime hinders the utilisation of an equivalent of sulphur shown by the bisulphide of carbon test. Now if this carbonate of lime were a fixed and definite quantity it would not interfere with the valuation, as I wish to show that if the conditions are fixed and known, the laws of supply and demand will bring the price payable per unit for any article to its proper and commercial level; but if any unknown quantity of interfering substance is present, that is to say if there is any risk, the price will always be depreciated according to the amount or extent of that risk. This has been the case with the spent oxide of iron of the gasworks. Some twelve years ago I devised a method for the assay of this material that gave the absolute amount of available sulphur, that is, the quantity which any vitriol manufacturer could burn off in his kilns; but directly the test was introduced the sellers said, and with justice it must be added, the price by the old test is low because there is a risk, the users have hitherto borne this risk, but if you desire us to take it upon our shoulders we shall have to charge you a little more for the article per unit. Thus it will be seen that there are many points to be considered in altering a method of commercial analysis, and the arguments already cited bear equally upon the subject of the alteration of the Liverpool soda test, which for many years now has proved a bone of contention amongst scientific chemists

*(To be continued.)*

## NOBEL'S EXPLOSIVES COMPANY AT THE GLASGOW EXHIBITION.

WITHIN recent times the explosive industry has made rapid strides in the development of blasting agents greatly superior in power to ordinary blasting powder. Nobel's explosives company are the largest manufacturers of nitro-glycerine explosives in the world. Specimens of their explosives, as well as the raw material from which the finished products are prepared, are shown, at the Glasgow Exhibition, in the form of harmless imitations, so that the most nervous visitor need have no hesitation in making a close inspection of the different articles. The exhibit is divided into four sections. Under section 1 are shown models of the nitro-glycerine compounds—dynamite, blasting gelatine, gelatine-dynamite, and other gelatinous compounds,

all the explosives shown being the inventions of the distinguighed chemist Mr. Alfred Nobel, the technical director of the company. Lead cones are also exhibited which have been operated upon by various explosive compounds, a marked difference being observable between the effects of the old blasting powder and the modern nitro-glycerine compound. Dynamite, the oldest nitro-glycerine explosive, is now being gradually superseded by the more powerful gelatinous compounds, one of which—blasting gelatine—is no less than 50 per cent. stronger than dynamite. Gelatine-dynamite, which is somewhat weaker than blasting gelatine, has, however, established itself as the leading mining explosive in this country, and the attainment of this position is largely due to its valuable quality of being unaffected by immersion in water. On blocks of copper, iron sheets, etc., are shown still further the effects of blasting with Messrs. Nobel's explosives, and the model cartridge hut which crowns the entire case is interesting as showing the method of preparing the cartridge, an operation which is performed by female workers. Under section 2 of the exhibit are shown detonators, electric detonator fuses, safety fuses, and other appliances connected with blasting. To the extreme left of the exhibit, under section 3, is shown a safe method of coal getting by the use of Mr. Miles Settle's patent gelatine-water-cartridge. The invention consists in fixing the explosive charge, with the detonator and electric wire attached, in a specially prepared form of support, and inserting it in a waterproof bag filled with water. The bag is then placed in the bore hole; the water extinguishes any spark or flame, and by this means all danger of explosion from fire-damp or gas is obviated. This system of blasting has been recommended by the Royal Commission on Accidents in Mines, and it is satisfactory to know that owners of coal mines are rapidly adopting it.

## IMPORTANT HEALTH PROSECUTION IN BIRMINGHAM.

### THE ANALYSIS OF WELL WATER.

At the Birmingham Police Court, recently—before Messrs. F. B. Goodman and Brame—Mr. Geo. Shaw, patent agent, Temple-street, and residing at 19, Whitmore-road, was summoned by John Parker, chief inspector in the Health Department of the Birmingham Corporation, for allowing to remain open on his premises a well containing water so polluted as to be injurious to health. Mr. Alfred Young, with whom was Mr. Hugo Young (instructed by Messrs. Mason and Son), appeared for the defendant. Proof was given of a sample of water having been taken from the well and handed to Dr. Alfred Hill, borough analyst. Dr. Hill said he had analysed the water, and found all-round evidence of pollution with organic matter derived from sewage. It was therefore dangerous for domestic use. The total solid matter in 100,000 parts was 148·2; nitrates and nitrites, 6·6; ammonia, ·001—making a previous sewage contamination of 65,690—and chlorine, 11·2; which showed that urine had gained admission to the well. Such a quantity of nitrates also showed the same thing, and of course where urine could go other matter could penetrate. Therefore no one could doubt that this water was excessively polluted with the oxidised products of sewage, and no medical man who knew anything about the connection between disease and polluted water would sanction for a moment use of the water which had been analysed. In 100,000 parts of Corporation water there were 26·2 parts of solid impurities; 0·209 nitrites; 0·001 ammonia—making a previous sewage contamination of 1·7 per cent., as against 65·69 per cent. in the well water—and the chlorine in town water was 1·05, as against 11·2 in the other.—Mr. A. Young: I presume you analysed this water yourself? Witness: I did not do everything myself.—What part did you do? I do not know.—Then you are unable to say from personal knowledge, derived from personal observations, that these figures are accurate? I conducted the analysis myself.—You cannot say that any particular part of the analysis is correct? I'll take responsibility of it. When I analyse waters in numbers every day, I cannot say that I did any one part of a particular analysis.—Mr. Young: Really, your worships, are we to go on with evidence of this kind? The very foundation of the whole thing is that the evidence shall be reliable. Dr. Hill goes on purely hearsay evidence.—Dr. Hill: It was done under my superintendence.—Mr. Brame: Were you present the whole time? Dr. Hill: That would be practically impossible.—Mr. Young: Well, it's ridiculous to go on with evidence of this kind.—Mr. Goodman: We must go on with the case, and accept Dr. Hill's analysis as accurate.—Mr. Young: What! when he is unable to vouch for the accuracy of any part of it? Mr. Young proceeded to cross-examine the witness as to whether he personally watched the various processes. Dr. Hill repeated his answer that he could not tell which process he personally conducted.—Mr. Young: This is simply trifling with the court.—Dr. Hill: Well, if I told you what was not the truth, would that be trifling with the court?—Mr. Young: Do you really know more, personally, of the analysis than the magistrates? Dr. Hill: Yes.—Well, what part of it? I cannot say.—Mr. Young: I repeat, this is trifling with the court. I suppose, Dr. Hill, you know the Corporation must prove their case? Dr. Hill: We shall prove our case, no doubt.—Mr. Young: It's no use going on.—Mr. Goodman: We can take the evidence for what it is worth.—Mr. Parker said the magistrates had power to order an independent analysis. They might adjourn the case for that purpose.—Mr. A. Young said that he would admit the accuracy of the analysis rather than have the expense of an adjourment, and would prove that the water was not injurious to health.—In the course of further cross-examination, Mr. A. Young asked Dr. Hill whether he was not aware that Mr. Shaw was formerly a professor of chemistry at Queen's College?—Dr. Hill: Yes, I am.—And taught you in your earlier days? (Laughter). Yes, well he tried to teach me, according to your cross-examination. (Laughter.)—Mr. Young: Perhaps you ceased to be his pupil too early. (Laughter).—Dr. Hill, in reply to other questions, said that nitrites came from decomposed animal matter. No chemical process could prove that a particular nitrate came from decomposed animal or decomposed vegetable matter. He would not pledge himself that the percentage of nitrites in the water in question would have the least possible harm upon the health of the drinker of the water. He knew that nitrates were due to animal decomposition.—Mr. A. Young: Have you never heard that the theory upon which the whole of this case is based—calculating on the assumption of "previous sewage or animal contamination"—has been long ago exploded? Dr. Hill: No; and it never will be exploded.—Mr. A. Young read an extract from a paper contributed by three eminent water analysts in the *Chemical Review* of 1882, which expressed the opinion of the authors that certain "scarecrow" terms would "follow in the wake of their fellow expression 'previous sewage contaminations,' which, no longer pointing a moral in the right directions, had been judiciously, though tardily, abandoned."—Dr. Hill said he did not agree with that. He admitted that Dr. Frankelin, the inventor of the term, had abandoned it so far as it was used as one of the columns in his calculations, but he was not aware that he had abandoned the theory. He assumed that the presence of 11·2 parts of chlorine was due to animal urine, because the unpeopled soil of Birmingham did not contain one part of chlorine in 100,000.—Mr. Young: The presence of this chlorine, or common salt, would not injure the health of anyone drinking the water? Dr. Hill: No.—The ammonia is the same as in Corporation water, so that there is really nothing injurious to health in these quantities? No.—And the object of determining those quantities is to ascertain whether there is anything so injurious? Yes.—Supposing I prove that Mr. Shaw has been drinking freely of this water for twenty or twenty-five years and has never had one day's illness, would not that lead you to calculate that the water could not be so polluted as to be injurious to health? No.—Mr. Young: Well, science may be one thing, but practical knowledge and experience are another. The fact that the family have never suffered would still leave undisturbed in your mind that it was the proper thing to stick to the "previous sewage or animal contamination?" Dr. Hill: Yes.—You know very well that there is a very large school of eminent chemists who maintain that the presence of nitrites in well-water is no indication whatever of anything injurious to health? There are some who do.—Some discussion took place between the Bench, Mr. A. Young, and Mr. Parker, when Dr. Hill made an observation.—Mr. A. Young: You are not an advocate, Dr. Hill, and have no right to speak as an advocate.—Dr. Hill: Well, I am the only one on our side and you have an army.—Mr. Goodman: Do you say this well is injurious to health, Dr. Hill?—Dr. Hill: No; I say it is dangerous, and likely to injure health at any moment.—Mr. Goodman: I think we must dismiss the case.—Mr. Parker: On what grounds, your worships?—Mr. Goodman: You have not proved that the well is so

polluted as to be injurious to health!—Dr. Hill: There is a danger constantly hanging over it.—Three other cases of a similar character were dismissed without any evidence being taken.

## PROFESSOR SCHORLEMMER, LL.D., F.R.S.

A COMPLIMENTARY dinner was given on Saturday evening last, at the Queen's Hotel, Manchester, to Professor Schorlemmer, of the Owens College, by his former pupils, to inaugurate the occasion of the conferring of the degree of LL.D. upon him by the Senate of the Glasgow University and to offer their congratulations. In the absence of Sir Henry E. Roscoe, M.P., who had been expected to be present and to act as chairman, one of Professor Schorlemmer's oldest pupils or friends, Mr. R. S. Dale, took the chair. Numerous congratulatory letters and telegrams were received by Dr. Schorlemmer, both from this country and from the continent, and early in the evening a letter was read from Sir Henry Roscoe, M.P., regretting that he would not be present and testifying to the high appreciation and regard he felt for the ability and talents of his old friend and colleague as well as for his personal qualities. Professor Thorpe proposed the health, long life, and prosperity of Dr. Schorlemmer, and referred to the fact that Glasgow, which had thus conferred honour on Professor Schorlemmer, had given rise to men such as Black and Thomson, names familiar to all chemists.—Professor Dixon expressed the hope that he might have the pleasure and advantage of working for many years yet to come with such a colleague as Professor Schorlemmer, and adding the regret that he had not enjoyed the privilege shared by so many around him of having been one of his pupils.—It may be interesting to note that it is principally to Schorlemmer's researches in the laboratory of the old Owens College in Quay-street that the science of chemistry owes the present system and orderly arrangement of the formerly obscure but very extensive and important branch of the paraffins and their alcoholic and acid derivatives. His researches into the constituents of American petroleum and the demonstration of the true constitution of those components, the paraffins, form classic ground. The isolation of the pure colouring matter aurin and the preparation of a series of its derivatives, with the final triumph in the shape of the transformation of aurin into pararosaniline, a research carried out in conjunction with his friend and the chairman of the evening, R. S. Dale, are achievements forming a chapter in organic chemistry of which the chemical department of the Owens College may be justly proud. These and many other researches Schorlemmer in by-gone years has shared with his pupils, and we are quite sure that a reunion such as took place on this occasion was not only a source of pleasure to their honoured guest himself, but served to recall agreeable memories of a connection with Owens College extending now over thirty years.

## CAUSTICISATION IN A VACUUM.

LATE in last year M. H. Herbert, of Barmen, near Elberfeld, patented a process of causticising alkaline carbonates in a vacuum. We have not been able to ascertain whether the process has been tried on the large scale at any works of magnitude, neither have we been able to discover what advantages the patentee has over those working the time-honoured process of causticising under the normal atmospheric pressure.

The process, however, consists in treating the carbonate solutions in a special apparatus from which the air can be expelled, with hydrate of lime at a convenient temperature. When the causticisation is complete the lye is filtered under the action of a vacuum, and the carbonate of lime residue treated with high-pressure steam in such a way as to eliminate the whole of the soda with as little water as possible.

In actual operation, the solution of the alkaline carbonate, is mixed with lime in an open vessel and the magma transferred to the causticiser, from which the air is withdrawn by means of a steam or water injector. The causticiser is then hermetically closed, and an agitator set in motion to keep the lime in suspension. When the action has been completed, the mixture is drawn into a closed filter in such a manner as to form a uniform layer of lime mud over its surface. After collecting the whole of the lye, which will run through under the vacuum, high-pressure steam is turned on, and kept so until the carbonate of lime contains but a trace of alkali.

The lime should not be put into the carbonate solution in the state of lumps, but as milk of lime, much in the same state as it is used for the Weldon process. A table, showing the amount of lime in solutions of various densities, may be found on another page.

## A SPECIAL VOLTMETER.

AN interesting and somewhat new departure has been made by the Walsall Electrical Company, in the shape of a special Voltmeter.

The action of the instrument is based on the repulsive force of two electro-magnets, the application of which, we believe is unique, and at the same time eradicates the uncertainty attending the use of permanent magnets or springs.

It is made in two sizes, registering 3 or 4 volts, in tenths and fifths respectively. The price, which is reasonable, together with its compactness, portability, and efficiency, leaves little to be desired. These sizes are specially suited for testing accumulators.

For electroplaters, this instrument—reading up to 10 volts, a range which meets all requirements—is invaluable as a means of avoiding the disadvantages of a rule-of-thumb system, and at the same time merely demanding on the part of the workman that he runs his dynamos at a speed necessary to maintain the desired reading, since the construction enables it to become permanently part of the circuit.

As applied to primary batteries, a special winding for the electro-magnet is substituted, thereby providing for each cell a test as if in open circuit.

Knowing the disastrous effect of one weak or defective cell on the whole battery, its eminent suitability for testing primary batteries used for telephonic and signal work on railways and in collieries, etc., is self evident. A larger size, upon the same principle, is made for electric lighting circuits.

We understand that a companion instrument, in the form of an Ammetre registering four or ten ampères, is shortly to be brought out.

## THE BURNTISLAND OIL COMPANY LIMITED.

THE report of the Burntisland Oil Company Limited has just been issued. The directors say:—In terms of the resolutions passed by the shareholders in October last, an issue of £100,000 of mortgage debentures has been made. The directors regret that the general body of the shareholders, when appealed to in November, did not apply for the debentures, although it was to their interest to do so. The directors, therefore, to protect and to promote the interests of the company, took up, and also got a number of their friends to subscribe for, a large proportion of the issue, and subsequently arranged for the balance not applied for, to be underwritten, with the option to the shareholders of the company, or the public, of making application for them until 6th September next. Since the closing of the accounts on 31st March last, a further sum of £6,150 has been paid up, making the total amount now paid up £59,370. With the money thus obtained, the balance of £29,000 of the original loan over the company's estate of £35,000, together with the whole of the loans at short call, amounting to £28,700, in all £57,700, were duly paid off as undertaken. In submitting an abstract of the balance-sheet and profit and loss account for the year ending 31st March, 1888, with the auditors' report thereon, it will be seen that they shew a

deficiency of £10,376. 10s. 6d. This deficiency is accounted for as under:—(1) To meet interest on the loans of the company amounting to £4,238. 19s. 3d. (2) The reduction in the value of stocks, by the continued depression in mineral oil products, and more especially in that of paraffin scale. (3) The loss incurred by the enforced stoppage of the company's operations in consequence of a strike of the workmen taking place in June last, and continuing for more than three months, thereby reducing the throughput and increasing the cost of manufacture. Acting on the opinion expressed at the last annual meeting of the shareholders, your directors have cordially co-operated with the other oil companies in endeavouring to bring about a cessation of the excessive competition then existing, and they are gratified to be able to report that binding and satisfactory agreements have been entered into—(1) between the Scotch mineral oil companies; (2) between the Scotch and American producers of scale; and (3) between all the leading candle-makers in the United Kingdom to regulate and fix minimum prices of paraffin burning oil, hard scale, and semi-refined wax and candles. The Scottish Mineral Oil Association have in this way been enabled to put a stop to the severe competition which had existed for twelve months previously, and which for a time threatened to bring disaster on the industry, and at the same time to fix prices which will aid the development of the candle trade without encouraging foreign competition. Your directors have no doubt that these various agreements will be faithfully adhered to, and they are satisfied that a decided improvement in the Scotch mineral oil trade may be fairly anticipated. Already, in consequence of these agreements between the American and Scotch scale producers, and the leading candle-makers, enhanced prices have been obtained, and the directors are convinced that the profits of the current year will show a much more satisfactory balance-sheet than that of last year, and in future enable the company to resume paying, if not its former dividends, at least such as will be equal to a fair rate of interest on its subscribed capital. For the first nine months, including the three months during which the strike lasted, the work of the company was carried on at considerable loss, while during the remaining three months of the financial year it showed a satisfactory profit. The profit obtained by the premium of £10,500 on the last issue of new shares has been, in accordance with last year's report, applied to the reduction of capital expenditure. This will make the total amount written off capital expenditure for depreciation, etc., in five years and five months £55,562. 10s., or equal to 11 per cent. each year, which keeps the capital account in a satisfactory state. The capital expenditure during the year on the candle works, new branch railway, oil works, etc., amounts to £17,132. 4s. 2d., as under—Kinghorn branch railway and siding extensions, £4,430. 16s. 8d.; candle works, for plant and completion of buildings, £5,356. 18s. 11d.; oil works, shale mines, railway sidings, etc., £7,344. 8s. 7d.—total, £17,132. 4s. 2d. The branch railway was hardly completed when the strike took place, thereby greatly diminishing the benefits which otherwise would have been derived from this source. The works, mines, and plant have been maintained in a thorough state of efficiency, and are still in first-class order. The directors have continued the insurance of the oil works, candle works, houses, plant, and stocks at moderate rates. In the reports received from Mr. J. R. Williamson, mining engineer, the shale mines are stated to be all in good order, and they continue to yield a large and satisfactory output. The capacity of the candle works, which are now completed, will enable the company, if necessary, to refine into wax and manufacture into candles their whole output of scale. The prices to be realised for candles during next season are higher relatively than the price to be obtained for either scale or wax, and considering the extensive connections now formed, the directors do not anticipate any difficulty in placing the company's whole make of candles in the market. The past year has been an exceptionally trying and unremunerative one for candle-makers, and being this company's first year of working, during which they also required to establish these connections, the depression was felt with double severity. Owing to the strike, during the past year the products manufactured, as compared with previous years, were less by about 30 per cent. This company's interest has suffered more severely than that of any other oil company, on account of its large yield of scale and the exceptionally low prices obtained for that product, either in a crude state or after it had been manufactured into wax or candles. The directors have to report the retirement from the board of Mr. Richard Brown, of Haylee, and of Mr. Thomas Wood, of Portobello. They deeply regret the loss by death of their respected chairman, Mr. John Waddell, of Inch, who was indefatigable in his exertions in promoting the interests of the company. The directors elected Mr. George Waddell, eldest son of their late chairman, and whose interest in the company is a large one, to fill one of the vacancies at the board. He is the only retiring director, and is eligible for re-election. Messrs. Lindsay, Jamieson, and Haldane, C.A., the company's auditors, retire at this meeting, and are eligible for re-election.

# Trade Notes.

The Alkali Makers' Association.—The annual meeting of this association was held, on Thursday last, at the offices of the secretaries, Messrs. Simpson, Wakeford, Goodhard, and Medcalf, at which, we hear, several subjects of great interest to the trade were discussed. For convenience, a meeting was also held on the same day of the Bleaching Powder Convention, to consider the weak state of the bleach market, which was regarded a serious matter, as there is at present at least 25 per cent. of unoccupied plant in the country.

The Cheshire Salt Mines.—At Winsford, Cheshire, there is a large colony of Polish workmen employed in the salt manufacture. At the monthly meeting of the Winsford Local Board, the surveyor reported a case of smallpox at Meadow Bank. The patient was a Pole. Two slight cases of scarlet fever had also been reported at Meadow Bank; the victims were young children of English parents. He had made a midnight inspection of the cottages occupied by the foreigners at Meadow Bank. He found overcrowding everywhere. At the Cocoa-rooms he found in one room on the ground floor six men, one woman, and four young children, eleven in all, and in the lobby one man; in another room on the ground floor there were four men; and in another three men, one woman, and five children. Upstairs there were ten men in one room and eight in another. At a cottage in the yard and adjoining the stables were three men in the front room, seven in another room, and one woman and two children in a back room. The rent was paid to Mr. Falk, and he packed the people in, as many as he could get. He believed the system adopted was to take the money for lodgings out of their wages. The discussion terminated without anything further being done.—*South Wales Daily Gazette.*

Royal Institution.—A lecture in French was given on Friday night in last week in the theatre of the Royal Institution by M. Alphonse Renard, LL.D., etc., Curator of the Royal Museum of Brussels, on the formation of volcanic rocks. By means of the oxyhydrogen light a large number illustrations were thrown on the screen, showing the progress of crystallisation in vitreous rocks and the many curious forms they assume, according to the degrees of heat or other circumstances present during their transformation from amorphous matter to the crystalline states, into what are known as crystallites. Other views showed lava in surging activity carrying along already long-formed crystals, breaking, corroding, and melting. After the limit of the power of observing with the naked eye had been reached, the microscope was brought in to reveal the minutest details of the admirable texture of the volcanic masses.

Coal for the Copper Mines.—Attention is being directed to the large shipments of coal from the Tyne to Valparaiso and other ports on the West Coast of America. Some weeks ago it was stated in our commercial columns that orders for a large quantity of coal had been booked for that district, and part of this is being sent now. If this be in any degree caused by the enlarged demand for copper—the latter being attributable to the copper syndicate—it is another proof that it is an ill wind that blows no one good. But probably there are other causes contributory to that demand which benefits the Northern mines and miners.

The Calciners' Strike.—The calciners on strike for an advance of wages at the Tharsis Copper Works, at Hebburn and Willington Quay, held a meeting the other day. No communication was received from the employers, but the whole question in dispute was discussed, and it was unanimously resolved that the men should not resume work unless the advance was granted. Later news:—The strike of the calciners at the Tharsis Works, at Hebburn and Wellington Quay, has advanced another stage. At Willington a meeting was held confirming the Hebburn decision, that the men do not commence work until the advance asked by them be conceded.

Tellurium.—That rare substance, tellurium—"paradoxical gold," as the early mineralogists called it—has lately been experimented upon by the French chemists, Berthelot and Fabre. The result of their researches appears in the *Annales de Chemie et de Physique*. They have made the remarkable discovery that this ambiguous element—the connecting link, as it were between the metals and non-metals, can exist in three distinct allotropic forms. Besides the crystalline form, so well known by its metallic lustre, tellurium may be obtained in two very distinct amorphous forms, two dark-coloured powders, which differ materially the one from the other, especially as regards their thermo-chemical behaviour. We have not to remind the reader that carbon has a similar peculiarity. It also has three allotropic forms, or exists in three distinct conditions. Differing as they do in appearance and qualities, a diamond, a piece of plumbago, and a lump of coke are yet of one and the same substance.

More Gold in Wales.—Another vein of gold has been struck three miles from Dolgelly, at Caldmernog, on an estate belonging to Mr. W. R. Davies, solicitor. Specimens of the ore have been sent to London, and pronounced to be exceptionally rich. The gold-bearing ore lay quite close to the surface, and the lode is understood to be next in value to the Mount Morgan Mine.

The Price of Coals.—The prices of coal and coke in Westphalia show a constantly rising tendency. For instance, this time last year, it was difficult to obtain 6 marks per ton for blast furnace coke, while at the present contracts for the second half of the current year are being concluded at 9 marks.

The Brick-Making Industry at Zwickau.—The brick-kilns at Zwickau have at present exceptionally large orders to execute. Considerable sales are effected not only with the Vogtland and the Erzgebirge but also with North Germany. The thousand of bricks which cost only 18 marks in 1882 now attains a price of 24 marks.—*Kuhlow.*

Explosion at a Steelworks.—Four men were badly burnt at William Jessop and Sons, Brightside Steel Works, on Wednesday night, the 30th ult., by an explosion. An ingot was being cast in a crucible furnace, when the ladle burst, causing the molten metal to fly.

A Private Still.—At the Thames Police Court, the other day, Richard Perkins, aged 50, described as a cordial maker, was sentenced to six months' imprisonment, in default of paying £200 fines; and James Harris, coal dealer, was ordered to pay £5 and forfeit his horse and cart, for carrying spirits without a permit through a London street from an illicit distiller.

The Trade of Cape Colony.—The official trade returns of Cape Colony for the quarter ending March 31 last shows that excluding specie, the imports amounted to £1,283,632, being an increase of £109,412, while the exports reached £2,290,109, the increase in this case being £452,860 over the corresponding period of 1887.

The Jubilee Coinage.—In the eighteeth annual report of the Deputy-Master of the Mint, Mr. Hill, the superintendent of the operative department, says:—"A novel feature in the work performed in this department during the past year was the casting of bars for coins of the new designs, namely, gold £5 and £2 pieces, and silver crowns and double florins, the amount of metal melted for these bars alone having been, for the gold pieces, 424,803 ounces; and for the silver, 1,511,851 ounces. The amount of gold melted for sovereigns and half-sovereigns, both of the design used from 1837 to 1887 and also of the new design, was 1,314,811 ounces. No less than 7,671,726 ounces, or 235 tons of silver, were converted into bars for the Imperial coinage and for war medals. In addition to the above, 1,152,551 ounces of silver bullion were melted into bars for the various Colonial coinages, and 26,165 ounces of fine silver for the Jubilee medals. The total weight of silver melted during the year was 8,850,442 ounces, equivalent to 271 tons, or 116 tons over the weight melted in the preceding year. The total number of pieces struck in the coining press-room was 50,848,438, a decrease of nearly 3,500,000 as compared with the number struck in 1886. The denominations were of thirty-four different kinds, and included the new five-pound piece, two-pound piece, crown, and double-florin."

The Deposition of Platinum.—A transparent deposit of platinum can be obtained by covering the bottom of a glass dish with a mixture of platinic chloride and glycerol; this is evaporated to dryness and finally washed with alcohol to remove the product of decomposition of the glycerol. The metallic deposit is perfectly transparent, the transmitted light being of a dark blue-grey tint. The commercial method of producing platinum mirrors by reducing the chloride with essence of lavender, and heating the containing vessel up to the temperature at which the glass softens does not yield a sufficiently cohesive product. Transparent layers of platinum and mirror deposits of iron, nickel, and cobalt, can also be obtained by electrolytic methods.—*Engineer.*

Boiler Explosions.—A Parliamentary paper has been published containing the report of the Marine Department of the Board of Trade on the working of the Boiler Explosions Act of 1882 during the year ended June 30, 1887. From this it appears that were 37 boiler explosions and 24 lives lost in the year in question, and both these numbers are slightly under the average for the years since the Act has been in operation. Besides the 24 persons killed by boiler explosions in 1886-7 there were also 44 persons injured.

A New Dyeing Process.—The dyeing of cotton is, on the whole, a more complicated process than the dyeing of wool, and hitherto it has only been possible to produce a fixed black dye on cotton by steeping the material in a solution of iron vitriol and chalk. This process, however, was not only dangerous to the health of the workpeople, but it poisoned the waste water, and prohibited the cultivation of fish in rivers where such dyeworks were in operation. Herr Heinrich Gross, of Crimmitzschau, has patented a new method of dyeing cotton fabrics black. The secret of this process consists in mixing a little ericolin or an infusion of herbs with the black dye. By this means the black dye is fixed in the cotton threads.—*Kuhlow.*

The Desiccation of Gases.—A recent paper on "The Desiccation of Gases," by J. D. Van der Plaats, gives an extended historical summary of the various methods which have been proposed for the desiccation of gases, together with an account of experiments made by the author. Anhydrous calcium chloride is more efficient than calcium chloride containing two mols. $H_2O$, but the difference diminishes at low temperatures. Calcium oxide absorbs moisture more slowly than anhydrous calcium chloride, and leaves twice as much water in the air as calcium chloride containing two mols. $H_2O$. Fused potash acts rapidly and much more completely than anhydrous calcium chloride, but less rapidly and less completely than concentrated sulphuric acid. Potash solution of sp. gr. 1·25 loses a considerable quantity of water if a current of air is passed through it for some time. Ammonia is almost completely dried by fused potash. Calcium chloride is a convenient but not very efficient desiccating agent. If the solution has been evaporated at 180° it always contains calcium oxide, which cannot be neutralised even by the prolonged action of carbonic anhydride or hydrogen chloride so long as the salt remains dry. Phosphoric anhydride is the best of all desiccating agents at present known, but it is inconveniently light and bulky. Not unfrequently it contains phosphorus anhydride, but this can be removed by Stas's method of distilling it in dry air. Concentrated sulphuric acid is cheap and convenient, allows the speed of the gaseous current to be watched, and dries gases almost perfectly.

Distilling in the States.—The aggregate amount of capital invested in distilling properties in Kentucky is estimated at $7,000,000. Estimating the annual production of whisky at 15,000,000 gallons, the sum of $6,000,000 is each year brought into the State. Of this amount $2,000,000 goes to the farmer for grain, $800,000 to coopers for barrels. A portion of the $6,000,000 goes to the miner for coal, to the machinist for machinery and repairs, to the thousands of labourers about the distilleries, to the railroads for transportation, to insurance companies for insurance, and to the State for taxes. Before the $15,000,000 gallons leave the State the general government taxes it to the extent of $10,000,000, and by the time it reaches the consumer it provides a living for about 300,000 people, and attains a value of between $75,000,000 and $100,000,000.

A Firm of Swindlers.—We have the best authority for describing the firm L. D. Cisin, "Gutenberg-Haus," Odessa, as a firm of swindlers of the first rank. Under the name of Toisin and Co. these swindlers devoted themselves hitherto exclusively to victimising French and Belgian merchants, but have latterly turned their attention to Germany. In Odessa their reputation is sufficiently well established. Unhappily information bureaux avail themselves of the services of this firm, employing it as their representative. The firm takes money for making favourable reports. At the present moment it is engaged in establishing a "Commercial Museum," for which it endeavours to obtain valuable collections of patterns, at the same time charging the exhibitors 150 francs per year.—*Kuhlow.*

The Cement Industry.—The yearly report of the Bonner Bergwerks-Verein represents the financial results of 1887 as satisfactory. The gross profits amounted to 297,059 marks, against 199,466 marks in 1886. The shareholders receive a dividend of 8 per cent. As to the situation of trade during the current year it is remarked in the report that business at the end of March was rendered very dull by the continued winter, but now appears to have become brisker. The demand for cement for fortifications continues, so that a satisfactory business year may be counted on. The authorities at the Royal Forts in Posen adjudicated on the 7th of June a contract for the supply of 9,863 tons of cement. To the Association of Puzzolan Cement Factories all German factories belong with the exception of those in Thale and Saarbrücken. The members of the Association are the Eisenwerk-Gesellschaft Maximilianshütte in Unterwellenhorn, Georgs-Marien-Bergwerks- und Hütten-Verein, Gewerkschaft Carl Otto in Cologne, Puzzolan-Cement-Fabrik in Braunschweig, and the firms Philipp Mayberg and Albrecht Stein in Wetzlar. The Association desires to maintain a constant standard of quality in puzzolan cement by controlling in common all the factories, and also to arrange cheap prices. At the last competition opened by the Civic Building Office at Charlottenburg, for the contract for building the justice court at Munich-Gladbaca, the tender of the Association was accepted.—*Kuhlow.*

A New Method of Testing Water.—It has long been known that if a voltmeter be filled with perfectly pure distilled water it is impossible to pass an electric current through it. If, however, a few drops of acid, or a small quantity of soluble salt, is dissolved in the water, the current passes and electrolysis takes place. The *Electrical Engineer* says:—"Dr. Carpené has proposed to make use of this fact to determine the quantity of a given impurity contained in water, as experiment shows that at a given temperature a definite quantity of any substance must be dissolved in the water before the current will pass."

# Correspondence.

## *ANSWERS TO CORRESPONDENTS.*

W.T.—We were not the writers of the article. It was sent us for insertion by an anonymous correspondent.

H.H.C.—Yes. We believe we have every manufacturer of repute upon our subscribers' list.

Advertiser.—Yes; for your information and others also, we may say we have subscribers in Germany, France, Spain, Russia, Switzerland, Austria, Turkey, Cyprus, Italy, Servia, Algeria, Natal, China, Japan, Java, New Zealand, Australia, Mexico, South America, United States, Canada, Norway, Sweden, Belgium, India, Ceylon, Brazil, Peru, and Chili.

J. J.—You could easily distil the quantity of tar you make, if the apparatus was properly arranged. It is rather a small quantity, but it could be made to pay under the special circumstances of your case.

B.J.C.—We strongly recommend the Dictionary. We would rather not say anything about the technical volume until we have seen it.

Paper Maker.—There is now no reason why the smallest quantity of esparto liquor should find its way down the stream. Neither has there been for the past fourteen years.

Y.Z.—Bleachworks do most seriously pollute the stream in spite of all that is said to the contrary.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## CHEMICAL ENGINEERING: THE GRINDING AND SIFTING OF SAMPLES.

*To the Editor of the Chemical Trade Journal.*

Sir,—Having had a very unusual experience in the grinding and sifting of refractory and troublesome materials, the following notes will no doubt be acceptable as supplementing the article on this subject in last issue. The mill illustrated is satisfactory for some purposes, but it will not deal rapidly and efficiently with many samples which come into the laboratory, and after a considerable amount of experimenting I settled down to the following arrangement:—I obtained a large wedgewood mortar, and made a tin bucket with a handle on each side. The mortar drops into this bucket to about three-fourths of its depth, the tin fitting closely at the upper edge. Between the bottom of the mortar and the bottom of the bucket is a space of about two inches, which is filled with plaster of Paris or Portland cement, the mortar being bedded solid in the cement whilst soft. When set this forms a solid base, which resists the heavy blows necessary in breaking up samples, and reduces the risk of fracture to a minimum. If by any accident the mortar is fractured, it is still available for rough work, where absolute chemical purity is not essential. The pestle is the ordinary form, but for heavy grinding the wood handle is cemented into a 5ft. length of 2-in. wrought-iron pipe, the upper end of which passes through a 3-in. wrought-iron ring fastened to the wall, forming a pivot which allows free motion in all directions, and at the same time keeps the pestle upright in position. The weight of the iron tube is sufficient for cracking any sample, and also for grinding the hardest materials, without any effort except that of pulling the pestle round the mortar.

With this arrangement such materials as porcelain, glass, and even tough fibrous minerals, can be reduced to impalpable powder in one or two minutes; and samples of several pounds weight can be dealt with without the slightest difficulty. For mixing and for grinding soft substances the same arrangement is used, except that the pestle used for this purpose has a wood shaft instead of an iron one, the weight being about one-fourth.

For sifting there is no material equal to that known as millers' silk, which is manufactured specially for flour mills. This can be obtained in all sizes from about 14,000 meshes to the square inch. Wire sieves anything like so fine as this are practically useless for many powders, the meshes getting constantly choked; and even with meshes so coarse as 1,600 to the square inch the separating power of silk is about three times that of brass, owing to the ease with which the silk clears itself. Owing to the manner in which the silk is woven the mesh keeps perfectly true to size, and as regards permanence, my own experience is that a silk sieve will outlast three or four brass ones. Thos. Fletcher.

Warrington.

## SOCIETY OF CHEMICAL INDUSTRY: MANCHESTER SECTION.

*To the Editor of the Chemical Trade Journal.*

Sir,—The article in your last issue prompts me to ask you to give space for the following note. Your article says that an informal meeting was held for the purpose of giving the hon. secretary of the section, Mr. J. Carter-Bell, an opportunity of replying to an attack which one of the members had made on him by circular with reference to the discharge of his official duties as secretary, and as a result a resolution was put to the meeting and carried, expressing confidence in the hon. secretary and thanking him for his exertions on behalf of the section.

I accused Mr. Bell of positively refusing to produce a balance-sheet to show the committee how the money was spent when he had been requested to do so, not only by myself on many occasions during the last four years, but notably by the chairman at one committee meeting, Mr. Carpenter, and his answer to this accusation was quite irrelevant. It was that he had spent the funds of the section very carefully; that he was very economical; and that he had spent a great deal of time over the secretaryship.

To show the pass to which this matter had come: At a meeting subsequent to the one last mentioned, Dr. Schunck, the chairman, on learning that the accounts had been passed at a meeting at which there was not a quorum and no minutes recorded, suggested that the only way he saw of dealing with Mr. Bell's refusal was for me to call a special meeting to discuss it.

With a secretary who had acted in this manner, any reasonable person, I should have thought, would have considered that he had long enough performed the duties of that office.

Now at the meeting referred to in your last issue, Mr. Bell did not deny that he had refused to produce to the committee a balance-sheet, or that the accounts had been passed at a meeting at which there was not a quorum, or that no minutes had been kept of what transpired at that meeting, and these were the points to which he should have directed his denial or his explanations at the last meeting, but to which he did not refer.

The resolution which Mr. Bell's friends passed at the meeting referred to amounted in effect to a statement that they were satisfied Mr. Bell had not misapplied the money of the section. I certainly did not suggest that he had; any idea in that direction could only have been obtained from his extraordinary conduct in refusing to do what a secretary ought to have done in justice to himself and as a duty to his committee, and as he informed us at the last meeting that

the number of accounts were few, they could surely have been easily reproduced. Why then did he not reproduce them instead of troubling his friends to pass a vote of confidence in him.

I was surprised to learn that some of the members thought I had personal animus against Mr. Bell because I had written the circular in question. I can only say that I cannot imagine anyone having animus against Mr. Bell. I certainly bear none towards him. I took it, that being a member of committee, I was morally and legally bound, together with the other members of the committee, to see that the affairs of the section were carried on in a business-like manner, or at all events in some approach thereto. I found after many and constant attempts to improve matters during the last four years that this was impossible with the present secretary, and I therefore represented the facts to the members of the section by circular.

I have long felt that the affairs of the section were carried on by the secretary in a loose manner unworthy of the Manchester Section, and I fear the few speakers at the last meeting, on the vote of confidence in Mr. Bell, have made a decidedly retrograde step as regards the efficiency of the section for the immediate future.—I am, etc.,

Manchester, 1st June, 1888. WILLIAM THOMSON.

## BLEACHING BY ELECTRICITY

*To the Editor of the Chemical Trade Journal.*

Sir,—It is evident from the tone of Dr. Hurter's letter in your issue of June 2nd, as well as from his previous criticism of M. Hermite's process, that he does not intend to discuss the matter on its simple merits. It will therefore serve no good purpose for us to enter into a wordy warfare with him. As soon as he brings forward further scientific *facts* bearing on the subject, we shall be very pleased to listen to them with respect.

Your anonymous correspondent, "W. M.," is evidently actuated more by a desire to prove us wrong than to arrive at the real value of the Hermite process. Were he anxious to form an exact estimate, he would take the trouble to avail himself of the offer we have expressly made of facilities for a full investigation of what has been done both in the laboratory and on the large scale.

What has been published necessarily gives but a small idea of the work that has been required for the elucidation of this difficult subject. We are quite content to await the results of a continuous trial of the process on the large scale, which, we believe, will be a sufficient answer to our critics.—Yours, etc., CROSS AND BEVAN.

4, New Court, Lincoln's Inn, W.C.

*To the Editor of the Chemical Trade Journal.*

Sir,—The letters of Dr. Hurter and W. M. in your issue of last week proves to my mind beyond the shadow of a doubt that in certain quarters of the alkali trade, notably the Tyne and Widnes, the Hermite bleaching process is looked upon with trepidation and fear. I venture to write these few lines as one very much interested in the subject, as I can quite see that if the process is made a practical one, it will be of immense value to the paper trade. For years we have been under the influence of the bleaching powder convention, and through that combination we do not know what they may treat us to some fine morning.

In order to have some idea of what the process was like in practice I have roughly experimented with a small dynamo, keeping as nearly as I could to the lines laid down in Messrs. Cross and Bevan's paper, and I am pleased to say that of many experiments some bleaching came out much cheaper than with bleach. The majority did not, but as some did, I think I am safe in attributing the failures to my clumsy manipulation. Anyhow, there is one fact which I have not seen mentioned, wood-pulp bleached by the Hermite process is quite a different bleach—to the eye—than with ordinary bleaching powder. How this is I cannot explain as I am not a chemist, and I will be content to leave the explanation in the hands of those chemists who have entered the lists in disputation. I would venture to suggest to Messrs. Cross and Bevan that we should be treated to a fuller account of the process as actually working on the large scale, which are all the figures I for one only care for. I know very well what scientific evidence is, for every chemist who swears Aye! two could be got to say Nay! and therefore, I think, we should be guided alone by practical results.—I am, etc.,

A PAPER MAKER.

## QUANTITY OF LIME IN MILK OF LIME.

| Sp. Gr. | °B. | °Tw. | CaO in 100 litres, kilos. | CaO per cubic foot, lb. |
|---|---|---|---|---|
| 1·074 | 10 | 15 | 13·3 | 8·3 |
| 1·091 | 12 | 18 | 15·2 | 9·5 |
| 1·107 | 14 | 21 | 17·0 | 10·6 |
| 1·125 | 16 | 25 | 18·9 | 11·8 |
| 1·142 | 18 | 28 | 20·7 | 13·0 |
| 1·161 | 20 | 32 | 22·4 | 14·0 |
| 1·180 | 22 | 36 | 24·0 | 15·0 |
| 1·199 | 24 | 40 | 25·3 | 15·8 |
| 1·220 | 26 | 44 | 26·3 | 16·4 |
| 1·241 | 28 | 48 | 27·0 | 17·0 |
| 1·262 | 30 | 52 | 27·7 | 17·3 |

## BEETROOT SOWINGS.

**France, May 23.**—The temperature has gradually risen during the week, and there has been abundant rain all throughout the beetroot region. Dry and moderately warm weather now prevails. For the beetroot crop the weather has been most favourable, and seems likely to compensate for the late sowing this year, which will not be finished until the end of May. Should the present weather continue vegetation will make rapid progress, and resowings will be unnecessary, which would at so late a period have been serious. The increased acreage for beetroot will probably be 5 per cent. in France.

**Germany, May 18.**—The weather has favoured rapid progress in sowing operations, and only in the inundated districts is sowing still delayed, but in these beetroots will be sown where originally grain crops were intended, which will tend to increase the acreage of beetroots. The increased acreage is estimated at 5 per cent., and the production of sugar in raw quantity will range from 970,000 to 1,070,000 tons, probably the latter figures, should the saccharine yield come up to the average. The springing up of the roots is very satisfactory, and the fields are generally in a good condition.

**Austria, May 16.**—Sowings are nearly ended, and the springing up of the roots is generally satisfactory. The delay in sowing may probably soon in part be regained. The acreage sown is certainly greater than that of last year, though it is yet too soon to say accurately how much. According to some the increase will vary from 15 to 25 per cent.

**For Europe** the increase of acreage sown with beetroots is estimated roughly at 7½ per cent.

The stocks of sugar are estimated by Mr. Licht as follows, in tons:—

| | 1888. | 1887. | 1886. |
|---|---|---|---|
| Germany, March 1 | 185,000 | 184,684 | 254,194 |
| Austria, March 1 | 98,000 | 109,400 | 33,300 |
| France, March 1 | 182,000 | 188,034 | 240,571 |
| Holland, March 1 | 15,219 | 43,886 | 31,844 |
| Belgium, March 1 | 27,410 | 34,683 | 33,536 |
| England, March 14 | 234,904 | 211,619 | 311,847 |
| Cargoes floating, Mar. 14 | 100,590 | 101,488 | 114,567 |
| Europe | 843,123 | 873,824 | 1,019,859 |
| United States, March 16 | 137,000 | 137,000 | 136,623 |
| Havannah and Matanzas, March 4 | 106,680 | 111,760 | 118,024 |
| Total | 1,086,811 | 1,122,584 | 1,274,506 |

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

STILL only a very indifferent account can be given of the condition of the market in this quarter. The experience of the past week talks of a further falling off rather than the improvement to which we have been so long in vain looking forward. There is no positive break in value, perhaps, as compared with last week's quotations, but there has been a perceptible wavering, and holders have been more than meditating a further paying out. Sellers of sulphate of ammonia, for instance, too hurriedly forecasting the market, were willing to part towards the close of the week con-

siderably under last Tuesday's estimate, one offering down to £11. 11s. 3d.; but the error of the move was quickly discovered, and things have hardened up again. To-day the position of sulphate is very nearly as strong as it was a week ago—say £11. 13s. 9d. to £11. 15s., June business. Paraffin chemicals are all very dead. True, this is the dead time of the year for oils, scale, and wax, but there is, in addition, a chill fallen upon the bargaining for new season's supply, which ought by this time, according to wont, to have been showing some head. The Burntisland Mineral Oil Company, formerly one of the big dividend concerns, has just confessed to a loss of over £10,000 as the result of last year's operations. Scotch dyers and bleachers are all rather slack, and the demand for bleach and dye chemicals is, in consequence, weak and unsatisfactory to dealers. General prices current are:—Soda crystals, 41s. 6d. net Tyne; alum in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £41 net Glasgow; soda-ash, 48/52°, 1d., less 5 % Tyne; caustic soda, white, 76° £8. 5s., 70/72° £6. 13s. 9d., 60/62° £5. 15s., and cream 60/62° £5. 15s., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks £5, and 1 cwt. casks £5. 5s. net Tyne; refined alkali, 48/52° 1⅛d., less 2½ % Tyne; salt-cake, 20s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 % to Scotch and English respectively; nitrate of soda, 9s. 4½d.; chlorate of potash, 5⅝d., less 5 % any port; sulphate of ammonia, £11. 13s. 9d. to £11. 15s. f.o.b. Leith; sulphate of copper, £21; paraffin scale, hard 2 7/16d., soft 2d.; paraffin wax, 120°, semi-refined, 2 11/16d.; paraffin spirit, 4½d.; paraffin oil (burning), 5⅝d. to 6d.; and lubricating ditto, 865° £4. 15s. to £5, 885° £6 to £6. 10s., and 890/95° £7. 10s. to £7. 15s.

## THE LIVERPOOL MINERAL MARKET.

The market has continued firm this week, with a decided inclination to an advance in some minerals. Manganese: Arrivals have been somewhat larger, but as the major portion of the arrivals have gone into stock, prices are unchanged. Magnesite (containing 98 % of carbonate of magnesia): No alteration to report; 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite (Irish Hill brand): Sales have increased considerably at full prices; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals have been larger, but little or nothing has gone into stock, hence prices are fully maintained, especially for best brands—90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) in good demand. Selected crystal lump is scarce at £6. 5s.; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s.; China clay: common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn). Pumice-stone: Prices are unaltered—ground, at £8; specially selected lump, finest quality, £11. 10s. Iron ore is steady; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s.; Cumberland, 8s. to 12s.; Purple ore, 6s.; Spanish manganiferous ore, 18s. to 20s. c.i.f., for forward delivery. Emerystone in more request, especially for good qualities—£5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore firm, 50 % being in demand. Antimony ore continues firm; £16 to £22 for fair quality. Antimony metal unchanged. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d. Carbonate (native), £15 to £16.; powdered (manufactured), £11 to £12. Limespar, 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; Italian and Bohemian, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferro-manganese: 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 10 %, £8. 10s. to £10. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

Chemicals, on the whole, have improved to a slight extent during the week. Soda-ash, 1d. up. Caustic soda: 60 % white, £5. 17s. 6d.; 60 % cream, £5. 15s.; 70 % white, £6. 17s. 6d.; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda, 9s. 6d. to 9s. 9d. Soda crystals, £2. 15s. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 12s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 22s. Bichromate of potash, 4⅝d. Bichromate of soda, 3½d. Carbonate of potash, £18 to £20. Chlorate of potash, 5⅝d. to 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. 10s., strong; lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper quoted at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Pearl ashes, £2. 3s. Chloride of zinc, £18.

## THE LIVERPOOL COLOUR MARKET.

Colours continue unchanged. Ochres: Oxfordshire is quoted £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s., to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per pound. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

There has been rather more inquiry of a general kind during the past week, and orders that have been waiting the turn of the month have, as usual, been more freely placed. Business on the whole, however, is unsatisfactory and prices show no improvement. In the alkali trade, soda-ash is more abundant. Prices, Lancashire and Tyne, average 1d. per degree f.o.b. Caustic soda is unchanged. Chlorate of potash remains at 5⅝d. Bleaching powder has been rather easier at £7. 5s., though £7. 7s. 6d. f.o.r. is firmly maintained by leading brands. Acetates of lime do not improve in price and demand at present is small. Brown and white acetates of lead continue dull. Acetate of soda is quoted firmer, but little business doing. Lead is rather easier. Litharge and nitrate of lead are unchanged. Sulphate of copper is steady. Muriate of ammonia has become more scarce and price has improved 10s. to 15s. per ton. Other salts of ammonia continue firm at old prices. Prussiate of potash is freely offered at low price. Potash, carbonate and caustic, are without change in value and meet with fair demand.

## METAL MARKET REPORT.

The movements in this market during the week have been irregular. Iron has had a reaction, last week having touched 37s. 1½d., it closes this week at 37s. 9½d.; but there is no new feature, it was only to be expected that the lowest figure for thirty years would attract buyers; the trade conditions are unaltered. Copper: Here there has been a rise for cash from £80. 10s. to £83. 2s. 6d., but for three months has only risen from £78. 2s. 6d. to £78. 10s. The command which the syndicate has of the Chili bars market at present, the formation of a large limited company to co-operate with the existing syndicate, and reported serious disaster to the Anaconda

mine have combined to force up the price for spot copper; but consumers are holding off, and stocks are increasing. Still, for the time, it looks as if the syndicate were masters of the situation. No one at the present moment would buy copper if they can possibly do without it. Tin: The sales of this metal last month were the largest ever recorded, and after the heavy buying which so materially strengthened the market, there has been a quieter tone and the price receded during the week from £85. 15s. to £82. 10s. for cash, and from £86. 10s. to £82. 10s. for three months; but the closing prices are £83 and £84, with a steady, firm tone. Spelter slightly easier, from £16. 15s. to £16. 10s. Lead, scarcely any change, about £12. 10s. Silver has recovered from 41 1/16d. to 42 1/8d.

## THE TAR PRODUCTS MARKET.

BENZOLES still continue in their downward course, and the small margin there is now between 90's and 50/90's is causing much astonishment. For 90's the utmost that could be obtained is 2s. 4d., while 50/90's is only value for 2s. 3d. Carbolic acid is sick, while creosote, anthracene, and pitch are still looking up. Creosote for Lucigen oil has now become an established article of trade, and good qualities, free from crystal, are eagerly sought after. Anthracene may be said to remain firm at 1s. 4½d. for A quality and 1s. 1d. for B. Pitch remains at 13s. f.o.b. Garston or Liverpool.

Tar distillers should not part with their crude naphtha too easily for forward delivery, unless they are determined to secure minimum profits. The scramble for tar and the receding prices of benzol show clearly to any well-informed mind that a big "bear" movement is on, in order to secure crude at low price for July–December. It is easy for the dullest mind to see what would happen if all the tar and all crude naphtha were to be directed into one channel. Both Lincoln and Birkenhead tar, we understand, will come to Manchester to be distilled.

## THE SULPHATE OF AMMONIA MARKET.

THE sulphate market is steady though quiet, and speculators would have prices much lower than they are at present if they could see their way to bring this about. Stocks are, however, against them, and when it is borne in mind that this is the period of the smallest make, manufacturers should not anticipate lower prices by accepting any offer that is made them. Beckton price is £11. 17s. 6d., and outside London makes £11. 15s. Leith and Hull may be quoted as £11. 12s. 6d to £11. 15s.—the former offered and the latter asked—and there seems a fair business doing between these two extremes. Makers need not fear of any glut of sulphate for some time to come; and if prices recede, as some have predicted, it will not be the fault of the market. As makers appear to be unwilling to sell forward, they must not be surprised at the alternate "bear" or "bull" movements which are sure to take place at short intervals; but if they understand these tactics they will know how to deal with them, and how to regard the various war cries that are raised from time to time.

# New Companies.

CAIMA TIMBER ESTATE AND WOOD PULP COMPANY LIMITED.—This company was registered on the 17th ult., with a capital of £75,000, in £5 shares, to acquire lands, building, and other property in the district of Aveiro, near Oporto, or elsewhere in Portugal, and to trade as planters, agriculturists, timber merchants, manufacturers and dealers in wood pulp, and dealers in marble, stone, lime, or other produce. The subscribers are:—

| | Shares. |
|---|---|
| F. W. Clifford, 22, Great Dover-street, engineer | 1 |
| C. W. Bowles, Edith-villas, Leyton, engineer | 1 |
| L. F. Stanway, Trelawn-road, Leyton, clerk | 1 |
| W. Cavendish, 2, Colham-street, Walworth, clerk | 1 |
| W. J. Chittenden, 16, Hickling-street, Rotherhithe, agent | 1 |
| C. A. J. Curtis, 33, Asylum-road, Peckham | 1 |
| A. E. Dayes, Pellatt-road, East Dulwich, clerk | 1 |

FOREIGN ROBURITE COMPANY LIMITED.—This company was registered on the 12th ult., with a capital of £250,000 in £10 shares, to acquire the right to manufacture an explosive called "Roburite." The subscribers are:—

| | Shares. |
|---|---|
| Capt. W. A. Berwick, New Barnet | 1 |
| A. L. Hutchison, 4, Guildhall-chambers, merchant | 1 |
| J. B. Campbell, 17, Basinghall-street, engineer | 1 |
| H. W. Wallis, F.C.S., 17, Holborn Viaduct, analytical chemist | 1 |
| W. B. Campbell, Leicester-villa, Sutton, secretary | 1 |
| A. Dexter, 11, Montague-street, Russell-square | 1 |
| W. Hollick, 17, Basinghall-street | 1 |

WIMBLEDON DISTRICT BRICK, TILE, AND POTTERY MANUFACTURING COMPANY LIMITED.—This company proposes to purchase from Mr. J. F. Pickering, of 21, Bloomsbury-street, certain land in the parish of Morden, Surrey, and to carry on business as brick, tile, and pottery manufacturers. It was registered on the 28th ult., with a capital of £50,000, in £2 shares, with the following as first subscribers:—

| | Shares. |
|---|---|
| E. Davies, 76, Bartholomew-road, N.W., clerk | 1 |
| W. L. Shepary, M.R.C.S., 2, Welles-road, N.W. | 1 |
| W. G. Buxton, 91, Huddleston-road, N., artist | 1 |
| S. J. Smerton, 25, Bredon-road, S.E., clerk | 1 |
| J. Luxford, Carshalton, contractor | 1 |
| A. G. Harvey, 5, Cristowe-road, Fulham | 1 |
| R. Howland, 53, Guilford-street, W.C., surveyor | 1 |

ARGENTINE PETROLEUM AND COAL COMPANY LIMITED.—This company was registered on the 14th ult., with a capital of £500,000, in £1 shares, 10,000 of which are termed founders' shares, to be issued as fully paid to the Mines Development Corporation Limited. The company proposes to acquire petroliferous and other mineral oil deposits, coal, anthracite, and similar minerals in the Argentine Republic. The subscribers are:—

| | Shares. |
|---|---|
| Jacob Brett, C.E., 49, Bloomfield-road, W. | 1 |
| T. W. Davies, 34, Guilford-street, W.C., accountant | 1 |
| J. S. C. Callingham, 48, Mayall-road, Herne-hill, shorthand writer | 1 |
| H. St. John Wileman, Ealing, financial agent | 1 |
| T. Parker, 17, Stapleton Hall-road, N., accountant | 1 |
| W. J. Antram, 268, Shirland-road, W., shorthand writer | 1 |
| F. E. Murdon, 6, Offley-road, Brixton, accountant | 1 |

AUSTRO-HUNGARIAN PETROLEUM COMPANY LIMITED.—This company was registered on the 24th ult., with a capital of £16,320, divided into 320 shares of £50 each, and 320 shares of £1 each, to acquire petroleum in lands in Galicia or elsewhere in Austro-Hungaria. The subscribers (who take £50 shares) are as follows:—

| | Shares. |
|---|---|
| W. B. Huntington, Darwen, paper stainer | 1 |
| J. E. Potter, 2, Ennismore-gardens | 1 |
| C. P. Huntington, Darwen, paper stainer | 1 |
| H. Simpson, Darwen, cashier | 1 |
| J. C. Potter, Darwen, paper stainer | 1 |
| C. Costeker, Darwen, solicitor | 1 |
| F. Baynes, Whetton, near Chorley, cotton spinner | 1 |

WATSON AND COMPANY LIMITED.—This company was registered on the 24th ult., with a capital of £2,000, in £1 shares, to trade as analytical and dispensing chemists, patent medicine vendors, and dealers in cigars, tobacco, and tea. Registered office, 3, Victoria-place, St. Austell, Cornwall.

FLEMINGS' OIL AND CHEMICAL COMPANY LIMITED.—This company was registered on the 28th ult., with a capital of £50,000, in £10 shares, to take over the business and assets of A. B. Fleming and Company Limited, of Flemings' Wharf, Millwall, oil and chemical manufacturers. The subscribers are:—

| | Shares. |
|---|---|
| D. Harris, Caroline-park, Edinburgh, chemical manufacturer | 1 |
| R. Irvine, Royston Granton, Edinburgh, chemical manufacturer | 1 |
| H. J. Fenner, St. John's-park, Blackheath | 1 |
| T. E. May, 51, Parkhurst-road, N., commercial traveller | 1 |
| F. Fenner, Flemings' Wharf, Millwall, manager of chemical works | 1 |
| W. R. Beilby, 15, Whitefriars-street | 1 |
| R. B. Fraser, 15, Whitefriars-street, chemical manufacturer | 1 |

INTERNATIONAL COTTONSEED CLEANING COMPANY LIMITED.—This company proposes to acquire and work the letters patent No. 2,830, dated 23rd February, 1887, and No. 5,954, dated 21st April, 1888, relating to improvements in machines for removing the lint or fibre from cotton-seed. It was registered on the 24th ult., with a capital of £75,000, in £1 shares, with the following as first subscribers:—

| | Shares. |
|---|---|
| A. Bigland, Exchange-buildings, Liverpool, merchant | 1 |
| H. S. Bower, Liverpool, broker | 1 |
| G. P. Forwood, 11, Dale-street, Liverpool, merchant | 1 |
| J. Miles, 34, London-road, Liverpool, carpet factor | 1 |
| W. Norman, 92, The Albany, Liverpool, merchant | 1 |
| W. Boxwell, 33, Exchange-alley, Liverpool, merchant | 1 |
| J. W. Hope, 3, Rumford-street, Liverpool, merchant | 1 |

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

Z. DRAKE & SONS, Paddock, near Huddersfield, manufacturing chemists.

J. CURTIS & Co., Cheetham, Manchester, curriers.

HANSON & CHARLES, Halifax, electrical engineers.

HOLLINS, BASFORD, & VIGGARS, Longport, brick and tile manufacturers.

HARLAND & SAINSBURY, Vyner-st., Cambridge-road, glass manufacturers.

J. MARSHALL & M. C. JONES, under the style of the Soho Oil Company, Townfield, Oldham, oil manufacturers.

T. H. BRACKEN & Co., Haulgh, near Bolton-le-Moors, paper manufacturers, as far as regards T. H. Bracken.

BURGE & WARREN, Kirby-street, Hatton-garden, vulcanite and india-rubber manufacturers.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

MILES, THOMAS, Thurnby, Leicester, and Thurmaston, Leicestershire, brick and tile manufacturer.

DIXON, RICHARD (trading as R. Dixon & Co.), Rochdale, soap manufacturer.

GILL, JOHN RICHARD, Marsh, near Huddersfield, late of Oakes, near Huddersfield, aerated water manufacturer.

### Adjudications.

DAY, THOMAS TUNNICLIFFE, and BRIAN THOMAS, Longton, Staffordshire, earthenware manufacturers.

DIXON, RICHARD (trading as R. Dixon & Co.), Rochdale, soap manufacturer.

Wood, John, Oldham, wholesale druggist.
Gill, John Richard, Marsh, near Huddersfield, late of Oakes, near Huddersfield, aerated water manufacturer.

**First Meetings and Public Examinations.**

Day, Thomas Tunnicliffe, and Brian, Thomas, Longton, Staffordshire, earthenware manufacturers. June 11, North Stafford Hotel, Stoke-upon-Trent; June 12, Town Hall, Stoke-upon-Trent
Dixon, Richard (trading as R. Dixon & Co.), Rochdale, soap manufacturer. June 12, Town Hall, Rochdale; June 18, Town Hall, Oldham.
Selby, William Sisson, High-street and Douglas-street, Deptford, Brockley-road, Brockley, and Church-street, Lee, Kent, oil and colour man. June 11, 109, Victoria-street, Westminster; June 8, County Court, Greenwich.
Miles, Thomas, Thurnby, Leicester, and Thurmaston, Leicestershire, brick and tile manufacturer. June 12, 28, Friar-lane, Leicester; July 11, Castle, Leicester.
Gill, John Richard, Marsh, near Huddersfield, late of Oakes, near Huddersfield, aerated water manufacturer. June 14, Messrs. Haigh and Sons, New-st., Huddersfield; June 15, County Court, Huddersfield.

**Notices of Dividends.**

Blackmore, William Henry, Bermondsey-street, Southwark, and Endwell-road, Brockley, tanner. First and final dividend of 2s. 7¾d., June 8, or any subsequent Wednesday, Messrs. A. C. Palmer & Co.'s, 7 and 8, Railway-approach, London Bridge, S.E.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels :—*

APPLICATIONS FOR LETTERS PATENT.

**Measuring Air and Gas.** H. Lane. 7674. May 25.
**Safety Oil Lamp.** W. Moore. 7676. May 25.
**Utilisation of Small Coal and Pit Slack.** L. Wacks. 7677. May 25.
**Manufacture of Aluminium.** W. G. Forster. 7685. May 25.
**Nitrosophenol Pigment Colours.** S. Pitt. 7687. May 25.
**Washing and Scrubbing Gas.** S. Chandler, sen., S. Chandler, jun., and J. Chandler. 7691. May 25.
**Gas Engines.** M. Janiot. 7698. May 25.
**Imitation Tortoise Shell.** G. M. Agher. 7701. May 26.
**Three-way Cocks.** A. Bruce. 7705. May 26.
**Bronze and other Metallic Paints.** L. H. Goggs and T. T. Irvine. 7708. May 26.
**Feed Water Heaters.** R. Shackleton. 7710. May 26.
**Purifying and Softening Water.**—(Complete Specification.) G. E. Stead and R. Lancaster. 7726. May 26.
**Mordanting, Dyeing, and Washing Materials.** F. Moore. 7733. May 26.
**Manufacture of Soap.** G. G. M. Hardingham. 7746. May 26.
**Manufacture of Cement.**—(Complete Specification.) G. J. Snelus, J. C. Swan, and H. Smith. 7747. May 26.
**Soda Crystals, Chlorides, and Oxides.** F. Trickett and J. Noad. 7754. May 26.
**Forcing and Drawing Chemical Liquids.** S. Spencer and J. S. Lord. 7768. May 18.
**Apparatus for Manufacture of Cement.** J. C. J. Smith. 7781. May 28.
**Improved Method of Dyeing, Washing, and Drying Textile Materials.**—(Complete Specification.) C. Böhringer. 7796. May 28.
**Bituminous Rock for Paving Purposes.**—(Complete Specification.) G. E. Belmor, 7798. May 28.
**Improved Oil Tank.** G. F. Gregory. 7807. May 29.
**Improved Fabric of Indiarubber and Felted Materials.** T. Stoward. 7828. May 29.
**Manufacture of Soap.** J. Taylor. 7830. May 29.
**Apparatus for Dyeing Wool Tops.** C. J. Alexander. 7846. May 29.
**Storage Batteries.**—(Complete Specification.) W. P. Thompson. 7853. May 29.
**Antiseptic Paper and Bandages.** W. P. Thompson. 7854. May 29.
**Treatment of Auriferous Ores.**—(Complete Specification.) W. Crookes. 7867. May 29.
**Drilling Pipes under Pressure.** H. H. Lake. 7873. May 29.
**Electric Batteries.** B. Willcox. 7876. May 29.
**Purification of Sewage.** J. H. Barry. 7883. May 30.
**Transmitting the Indications of Thermometers.** A. P. Trotter. 7884. May 30.
**Hydrocarbon Vapour Engines.** J. F. Schnell. 7893. May 30.
**Extraction of Metals from Metallic Chlorides.** J. E. Bennett. 7900. May 30.
**Artificial Stone.** J. Dougall and T. D. Harries. 7905. May 30.
**Artificial Portland Cement.** A. Fleiner, H. Hauenschild, and A. Bauermeister. 7915. May 30.
**Hydrocarbon Motor Engines.** W. T. Stubbs. 7927. May 30.
**An Improved Lubricator.**—(Complete Specification.) G. Fairclough. 7945. May 31.
**Purification of Sewage.** B. Jagger. 7947. May 31.
**Improved Valve for use in Raising and Forcing Fluids.** A. Mc.Glashan. 7955. May 31.
**Lamps for Oils which Solidify at a Low Temperature.** D. Ballardie. 7959. May 31.
**Kneading or Mixing Machines.** E. Halot, J. Halot, and F. de Posch. 7970. May 31.
**Portland Cement.** W. G. Margetts. 7976. May 31.
**The Transport and Preservation of Ice.** L. A. Sault. 7992. May 31.
**Converting Iron into Steel.**—(Complete Specification.) H. H. Lake. 7995. May 31.
**Colouring Matters.** H. H. Lake. 7997. May 31.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.
*Week ending May 26th.*

**Alkali** *(otherwise undescribed)*—
France, 105 c. Arnatti & Harrison
**Acetic Acid**—
Holland, 10 blns. Spies, Bros. & Co.
" 25 cbys. Beresford & Co.
**Acetate of Lime**—
U. States, 169 bgs. Allan, Bros. & Co.
**Bones**—
Gibraltar, 12½ t. Goad, Rigg & Co.
Sydney, 2 Low, Sons & Co.
**Brimstone**—
Italy, 125 t. Kindersley & Johnson
**Barytes**—
Germany, 23 cks. O'Hara & Hoar
Holland, 22 W. Harrison & Co.
Belgium 44 "
" 132 A. Zumbeck & Co.
**Barium Chloride**—
Germany, 12 cks. Petri Bros.
**Caoutchouc**—
East Indies, 185 c. L. & S. K. D. Co.
" 211 Ralli Bros.
" 175 Jackson & Till
C. America, 50 Stiebel Bros.
" 3 Kebbel, Son & Co.
Mauritius, 39 "
Madagascar, 18 J. H. & G. Scovell
East Indies, 95 Wrightson & Son
U. S. Columbia, 5 c. G. Dunlop & Co.
France, 80 c. Flageollet & Co.
" 40 Kleinwort, Sons & Co.
Cape, 30 D. Currie & Co.
Aden, 45 L. & S. K. D. Co.
Zanzibar, 42 Hale & Son
**Chemicals** *(otherwise undescribed)*
Germany, £26 Phillipps & Graves
" 764 A. M. Zimmermann
Belgium, 25 Petri Bros.
Germany, 19 Spies, Bros. & Co.
Holland, 27 Beresford & Co.
Germany, 133 L. & S. K. D. Co.

**Chemicals**—*continued.*
Germany, £15 Phillipps & Graves
" 136 A. & M. Zimmermann
**Cream Tartar**—
France, 10 cks. C. F. Gerhardt
" 5 W. V. Robinson & Co.
" 4 Webb, Warter & Co.
" 16 "
" 5 Sutcliffe & Gosden
" 20 Webb, Warter & Co.
Spain, 6 Middleton & Co.
" 6 C. Christopherson & Co.
" 2 Evans, Lescher & Co.
**Caustic Potash**—
France, 8 dms. F. W. Berk & Co.
" 12 cks. Weatherley, Mead and Co.
" 20 dms. Petri Bros.
**Copperas**—
Germany, 16 cks. Burgoyne, Burbridges & Co.
**Dextrine**—
Germany, 300 bgs. J. Barber & Co.
" 25 Leach & Co.
B. W. Indies, 250 Union Lighterage Co.
**Dyestuffs**—
**Extracts**
France, 150 cks. J. Greig
U. States, 25 brls. M. D. Co.
**Argols**
Italy, 106 bgs. L. & S. K. D. Co.
**Gambier**
E. Indies, 834 bls. Lewis & Peat
" 1,233 L. & S. K. D. Co.
" 626 R. & J. Henderson
" 442 L. & S. K. D. Co.
" 843 pkgs. Beresford & Co.
**Indigo**
E. Indies, 2 chts. Rehder & Co.
" 4 Pittis & Sons
" 76 L. & S. K. D. Co.
" 84 E. & W. I. D. Co.
" 13 Arbuthnot, Latham and Co.
" 15 Stansbury & Co.
" 32 "
" 17 L. & S. K. D. Co.

**Myrabolams**
E. Indies, 683 bgs. J. P. Alpe & Co.
**Cutch**
E. Indies, 1,000 bxs. Wallace Bros.
" 5 cs. L. & S. K. D. Co.
" 400 bxs. Wrightson and Sons
" 418 Leach & Co.
" 160 cs. Anderson, Weber & Co.
**Tanners' Bark**
Adelaide, 26 t. Devitt & Hett
" 34 S. Barrow & Bro.
" 110 Baxter & Hoare
Hobart, 10 Leach & Co.
**Divi Divi**
U. S. Columbia, 250 bgs. G. Dunlop and Co.
**Glycerine**—
Germany, £188 A. & M. Zimmermann
" 15 T. H. Lee
" 35 H. Lambert
" 14 G. Haller & Co.
**Glucose**—
Germany, 100 cwts. P. Windmuller
" 100 Fellows, Morton and Co.
" 110 J. Barber & Co.
" 200 M. D. Co.
France, 200 M. H. Voss
" 1 W. Ryde
Germany, 400 E. Pink & Sons
" 85 E. W. Carling & Co.
" 200 Baxter & Hoare
" 54 G. Ward & Sons
" 50 Hyde, Nash & Co.
" 1,490 T. M. Duche & Sons
" 734 Andorsen, Becker and Co.
" 200 J. Barber & Co.
" 400 M. D. Co.
France, 200 Barrett, Tagant & Co.
U. States, 400 G. Doo
**Guano**—
Peru, 1615 t. Anglo-Cont. Guano Wks.
**Gutta Percha**—
E. Indies, 320 c. J. H. & G. Scovell

**Gutta Percha**—*continued.*
E. Indies, 617 c. Kleinwort, Sons and Co.
B. W. Indies, 170 c. Jackson & Till
**Isinglass**—
E. Indies, 5 pkgs. Johnson, Rolls and Co.
China, 7 L. & S. K. D. Co.
Japan, 2 Prs. Brook's Wharf
China, 31 E. Boustead & Co.
U. States, 19 pkgs. Knight & Morris
**Manure**—
**Phosphate Rock**
Holland, 930 t. Cloid, Routledge and Co.
**Bone Meal**
E. Indies, 250 t. Gonne, Croft & Co.
**Bone Dust**
E. Indies, 50 t. Gonne, Croft & Co.
**Salt**
Germany, 100 t. Agricultural & Horticultural Co.
" 200 Lawes Manure Co.
**Gypsum**
France, 80 t. J. Burnett & Sons
" 450 "
**Kainit**
Harburg, 300 t. J. Jensen & Co.
Germany, 220 t. J. Gibbs & Co.
**Naphtha**—
Holland, 9 dms. Stein Bros.
**Pearl Ash**—
France, 130 c. Petri Bros.
" 220 F. W. Berk & Co.
" 65 "
**Potassium Sulphate**—
Germany, 300 bgs. Hunter, Waters and Co.
**Paraffin**—
Germany, 56 cs. H. Hill & Sons
**Plumbago**—
E. Indies, 63 cks. Thredder, Son and Co.
France, 7 A. Henry & Co.
Germany, 17 P. Hecker & Co.
" 52 Brown & Elmslie
" 50 cs. Wright & Ashbridge

**Pitch—**
Germany, 67 brls. London Oil Storage Co.
**Potassium Muriate—**
Holland, 32 cks. J. Owen
**Sodium Borate—**
Germany, 29 cks. F. Smith
**Sodium Silicate—**
Germany, 15 brls. E. & W. I. D. Co.
**Sodium Nitrate—**
Pisagua, 11,745 bgs. W. Montgomery & Co
**Saltpetre—**
Germany, 56 cks. J. Hall & Son
" 118 P. Hecker & Co.
" 70 "
**Stearine—**
N. Russia, 7 cs. Bailey & Leetham
**Tartaric Acid—**
Holland, 4 cks. C. Christopherson and Co.
" 15 Webb, Warter & Co.
" 10 kgs. Middleton & Co.
" 42 pkgs. R. Greening
" 36 cks. "
" 8 Middleton & Co.
**Tartars—**
Italy, 212 bgs. W. Durrant & Co.
" 106 J. Turner & Co.
**Ultramarine—**
Holland, 10 pkgs. J. C. Lamb
Belgium, 20 cks. Arnati & Harrison
France, 3 brls. 7 cs. G. Rahn & Co.
" 8 cks. "
Holland, 12 cks. Phillipps & Graves
" 16 A. Henry & Co.
" 2 Randall Bros.
**Verdigris—**
France, 4 cks. Webb, Warter & Co.
**Zinc Oxide—**
Holland, 250 cks. T. Hubbuck & Sons
" 100 Beresford & Co.
" 45 H. Koenigs & Co.
" 35 M. Ashby
Germany, 20 J. Matton
Holland, 51 Koenigs & Co.
" 250 T. Hubbuck & Sons
Germany, 242 brls. M. Ashby

## LIVERPOOL.

*Week ending May 30th.*

**Albumen—**
Genoa, 5 cs P. Macdonald & Co.
**Alum—**
Rotterdam, 32 cks.
**Brimstone—**
Catania, 130 t. R. Roberts & Son
" 140
**Bones—**
Boston, 126 bgs.
**Boracic Acid—**
Leghorn, 20 cks.
**Barytes—**
Hamburg, 23 cks.
**Borax—**
Havre, 10 cks.
**Chemicals** *(otherwise undescribed)*
New York, 213 bgs.
Bilbao, 13 cks.
Rotterdam, 10
**Caoutchouc—**
Kinsembo, 2 cks. Jaffe & Sons
" 3 Taylor, Laughland and Co.
Mussera, 15 bgs. 3 cks. "
" 1 Jaffe & Sons
Ambrizette, 35 bgs. S. Pearson
" 5 cks. Dumas, Beraud and Co.
" 18 Taylor, Laughland and Co.
Muculla, 9 "
Banana, 1 Dumas, Beraud & Co.
Landana, 1 "
" 3 Valle & Azevedo
Blackpoint, 5 Pinto Leite & Nephew
Loango, 12 Edwards Bros.
Nyanza, 13 "
Sette Cama, 11 cks. "
Cape Lopez, 12 J. Holt & Co.
Gaboon, 8 Dumas, Beraud & Co.
" 7 A. V. Heyder
" 5 J. Holt & Co.
Elobey, 7 "
Cameroons, 1 Rider, Son & Co.
" 2 A. Herschell
Victoria, 2 bgs. 3 cks. E. Ost & Co.
" 1 cs. 4
Bibundi, 4 L. Hart & Co.
Old Calabar, 1 cs. 4 cks. Pickering and Berthoud
" 1 ck. Havard & Co.

**Caoutchouc—***Continued.*
Sette Kroo, 1 bg. T. E. Tomlinson
Rio Janeiro, 16 bgs.
Pernambuco, 3 brls.
Maranham, 1 cs. Gunston, Sons, and Co.
Philadelphia, 20 pkgs.
Ambriz, 3 bgs.
Assinee, 6 cks. F. & A. Swanzy
Grand Bassam, 1 bg. M. L. Levin
" 1 W. Bradbury & Co.
" 1 Pickering and Berthoud
Sierra Leone, 12 brls. "
La Leone Northern, 95 brls. 2 pns. G. Hudson
**Camphor—**
Rouen, 2 cks. R. J. Francis & Co.
**Cream Tartar—**
Naples, 1 ck. R. Powles
" 22
Chala, 28 bgs.
Barcelona, 7 cks. Sachse & Klemm
" 5 F. Reid & Co.
**Charcoal—**
St. Nazaire, 700 sks.
**Dyestuffs—**
**Divi Divi**
Rio Hache, 153 t. E. Brownbill & Co.
**Orchella**
Loando, 25 bgs. A. Barbosa & Co.
Nova Redonda, 33 bls. "
**Cochineal**
Grand Canary, 22 bxs. Lathbury & Co.
" 35 H. R. Toby & Co.
**Extracts**
New York, 100 bxs.
Antwerp, 2 cks. J. T. Fletcher & Co.
New York, 48 brls.
**Shumac**
Palermo, 100 bgs. T. Kitchen & Co.
" 100 bls. 600 bgs.
**Indigo**
Maranham, 1 cs. J. Wyman
**Argols**
Oporto, 51 cks. The German Bank
Bordeaux, 12 sks.
**Glycerine—**
Rotterdam, 20 cs. 10 cbys.
**Glucose—**
New York, 425 brls.
Hamburg, 7 cks.
**Horn Piths—**
Valparaiso, 65 sks. Torome, Son, and Co.
Antwerp, a quantity
**Iodine—**
Valparaiso, 9 brls. A. Gibbs & Sons
" 18
**Isinglass—**
Maranham, 4 cks. Gunston, Sons, and Co.
" 3 cs. H. Rogers, Sons, and Co.
**Manure—**
**Phosphate**
Terneuzen, 2,000 bgs.
**Phosphate Rock**
Antwerp, 370 t.
**Pyrites—**
Huelva, 1,219 t. Tennants & Co.
**Potash—**
Montreal, 33 brls. J. M. Bucknall and Co.
**Potassium Sulphate—**
Brussels, 96 cks. J. L. Lyon & Co.
" 32 Heywood, Clark & Co.
" 11 J. J. L. Cordwell
" 600 bgs. W. R. Taylor & Co.
**Stearine—**
Rotterdam, 1 kg.
**Sulphur—**
Catania, 169 bgs. 71 brls.
**Sodium Nitrate—**
Iquique, 7,564 sks. Baring Bros. & Co.
Pisagua, 7,750 bgs. N. Waterhouse and Sons
**Silica—**
Hamburg, 200 bgs.
**Soda—**
New York, 4 brls. Richardson, Spence & Co.
**Tartaric Acid—**
Rotterdam, 11 cks.
" 4
**Tartar—**
Naples, 3 cks. R. Powles
Bordeaux, 1
**Tar—**
Wilmington, 2,245 brls.
**Ultramarine—**
Rotterdam, 14 cs. 14 cks. 8 brls.
**Zinc Oxide—**
Antwerp, 10 brls.

## GLASGOW.

*Week ending June 2nd.*

**Barytes Sulphate—**
Antwerp, 100 bgs.
**Barytes—**
Rotterdam, 91 cks.
**Borax—**
Hamburg, 3 cks.
**Brimstone—**
Catania, 24,000 c. T. Lawrie
**Chemical Balances—**
Rotterdam, 4 bxs. J. Rankine & Son
**Chemicals** *(otherwise undescribed)*
Hamburg, 2 cs.
**Dyestuffs—**
**Extracts**
Antwerp, 4 cks.
**Alizarine**
Rotterdam, 44 cks.
**Manure—**
**Bone Meal**
Calcutta, 3,254 bgs. W. J. Stewart
**Waste Salt**
Hamburg, 26 cks. 36 brls.
**Sulphur Ore—**
Seville, 170 t. Seville Sulphur and Copper Co.
**Sulphur—**
Catania, 300 t. J. Poynter & Son
" 46 brls.
**Sulphuric Ether—**
Hamburg, 3 cs.
**Tartar—**
Bordeaux, 12 pkgs. J. & P. Hutchison and Co.
" 19
**Tartar Emetic—**
Hamburg, 1 ck.
**Tar—**
New York, 600 brls.
**Wood Alcohol—**
New York, 40 dms.

## HULL.

*Week ending May 31st.*

**Acetic Acid—**
Rotterdam, 1 bx. Wilson, Sons and Co.
**Albumen—**
Hamburg, 38 cks.
**Alumina—**
Rotterdam, 42 cks. W. & C. L. Ringrose
**Barytes—**
Rotterdam, 24 brls. Fellows and Furley
Antwerp, 20 W. S. Merriken
" 200 bgs. 48 brls. H. F. Pudsey
Bremen, 22 cks. Blundell, Spence and Co.
Rotterdam, 21 Todd & Son
" 12 H. B. Toole & Co.
**Chemicals** *(otherwise undescribed)*
Antwerp, 31 pkgs. Wilson, Sons and Co.
Dunkirk, 62 30 cks. "
Rotterdam, 20 cks.
Stettin, 10 brls. "
Dunkirk, 123 pkgs. "
**Carbolic Acid—**
Hamburg, 2 cks. Wilson, Sons & Co.
**Dyestuffs—**
**Alizarine**
Rotterdam, 25 cks. Hutchinson and Son
" 48 "
" 67 W. & C. L. Ringrose
" 34 "
" 5 "
**Dyestuffs—***(otherwise undescribed)*
Antwerp, 5 brls. Wilson, Sons & Co.
Dunkirk, 5 cs. "
**Argols**
Bordeaux, 41 bgs. Rawson & Robinson
**Madder**
Rotterdam, 2 cks. Hutchinson and Son
**Valonia**
Smyrna, 221 t.
**Myrabolams**
Bombay, 3,387 bgs.
**Disinfectant—**
Amsterdam, 22 cks. Wilson, Sons and Co.
**Dextrine—**
Hamburg, 20 bgs.
**Glucose—**
Hamburg, 200 bgs. Wilson, Sons and Co.
" 25 cks.
Stettin, 111 800 bgs.
**Manure—**
**Manure—***(otherwise undescribed)*
Hamburg, 46 bgs.
Ghent, 706
**Phosphate**
Antwerp, 80 t. Bailey & Leetham
**Kainit**
Hamburg, 100 bgs.
**Naphthlanic Acid—**
Rotterdam, 1 bx. Wilson, Sons & Co.
**Potash—**
Rotterdam, 13 cks. Wilson, Sons and Co.
**Potassium Sulphate—**
Antwerp, 16 cks. Wilson, Sons & Co.
**Pyrites—**
Huelva, 841 t. G. R. Sanderson & Co.
**Sodium Silicate—**
Rotterdam, 18 cks. Lawson & Sons
**Saltpetre—**
Hamburg, 50 bgs. Wilson, Sons and Co.
**Soda—**
Rotterdam, 6 cks. G. Lawson & Sons
" 2 "
**Sodium Nitrate—**
Hamburg, 1,576 bgs.
**Tartaric Acid—**
Rotterdam, 5 cks. G. Lawson & Sons
**Talc—**
Antwerp, 2 brls. Wilson, Sons & Co.
**Turpentine—**
Libau, 52 cks. J. L. Seaton
Bordeaux, 40 Rawson & Robinson
" 187 brls.
Konigsberg, 30
**Tartar—**
Bordeaux, 10 cks. Rawson & Robinson

## TYNE.

*Week ending June 2nd.*

**Barytes—**
Rotterdam, 22 brls.
**Copper Precipitate—**
Huelva, 10 t.
" 261 Scott Bros.
**Chemicals** *(otherwise undescribed)*
Hamburg, 1 cs. Tyne S. S. Co.
**Glucose—**
Hamburg, 37 cks. Tyne S. S. Co.
**Glycerine—**
Hamburg, 4 cs. Tyne S. S. Co.
**Manure—**
**Waste Salt**
Hamburg, 275 t.
**Pyrites—**
Huelva, 1,761 t. Scott Bros.
**Sulphur Ore—**
Pomaron, 1,000 t.
Huelva, 1,136
**Sodium Nitrate—**
Iquique, 6,107 bgs. Havelock & Uster
**Ultramarine—**
Rotterdam, 20 cs.

## GOOLE.

*Week ending May 30th.*

**Anthracene, Crude—**
Boulogne, 28 cks.
" 1 cs.
**Potash—**
Dunkirk, 26 dms.
" 37 cks.
" 9
" 20 dms.
**Phosphate—**
Ghent, 1,000 bgs.
**Saltpetre—**
Hamburg, 40 kgs.
Antwerp, 100 bgs.
Hamburg, 39 cks.

## GRIMSBY.

*Week ending June 2nd.*

**Manure—**
**Kainit**
Hamburg, 150 bgs.
" 200

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending May 29th.*

**Alum—**
Sydney, 10 t. 2 c. £46
**Arsenic—**
Napier, 85 dms. £45
**Ammonia Carbonate—**
Paris, 20 cks. £90
Bordeaux, 15 62
**Alum Cake—**
Melbourne, 7 t. £20
**Alumina Sulphate—**
Oporto, 5 t. 4 c. £23
**Ammonia Sulphate—**
Demerara, 9 tcs. £80
**Brimstone—**
Barbadoes, 25 t. £120
**Cream Tartar—**
Melbourne, 24 pkgs. £262
Brisbane, 7 cs. 52
Natal, 2 c. 13
**Citric Acid—**
New York, 2 t. 10 c. £477
Antwerp, 1 175
New Orleans, 30 kgs. 259
Genoa, 1 t. 175
**Chemicals** *(otherwise undescribed)*
Bombay, 11 pkgs. £134
Melbourne, 23 193
Sydney, 65 cs. 65
Algoa Bay, 73 210
Otago, 3 pkgs. 21
Shanghai, 15 cks. 10
**Carbolic Powder—**
Launceston, 33 pkgs. £97
Jamaica, 68 79
**Carbolic Acid—**
Napier, 25 dms. £23
Algoa Bay, 20 22
Rotterdam, 37 runlets 284
**Caustic Soda—**
Melbourne, 16 t. 7 c. £137
Launceston, 19 dms. 39
Townsville, 5 t. 2 c. 45
Varna, 30 dms. 57
Terneuzen, 10 t. 10 c. 80
Dunedin, 3 10 40
**Camphor—**
Bombay, 1 t. 19 c. £203
**Caustic Potash—**
Dunedin, 1 t. 1 c. £25
**Guano—**
Demerara, 16 tcs. £128
St. Lucia, 50 t. 600
**Manure—**
Bluff Hr., 50 t £210
Barbadoes, 226 1,482
Trinidad, 150 t. 13 c. 1,580
Rotterdam, 15 2 57
Dunedin, 50 0 110
Samarang, 30 0 360
Antigua, 11 8 116
St. Nazaire, 250 bgs. 250 brls. 200
St. Kitts, 11 t. 8 c. 115
Malaga, 43 12 440
Antwerp, 120 0 1,440
**Oxalic Acid—**
Genoa, 2 cks. £18
**Oxalate of Potash—**
Marseilles, 6 t. 6 c. £160
**Potassium Chlorate—**
Sydney, 5 t. £260
Algoa Bay, 5 c. 14
**Phosphoric Acid—**
Mauritius, 22 t. 5 c. £361
**Sulphuric Acid—**
Melbourne, 8 c. £35
**Sheep Dip—**
Natal, 136 cs. £377
Dunedin, 65 dms. 60
Algoa Bay, 9 t. 4 c. 520
**Saltpetre—**
Oporto, 7 t. 8 c. £151
Brisbane, 1 0 22
Lisbon, 3 15 78
Newcastle, 1 0 22
Piræus, 1 5 26
Malaga, 6 17 145
**Sulphur, Flowers—**
Cape Town, 500 kgs. £384
Newcastle, 3 t. 31
Lisbon, 100 brls. 81
E. London, 70 pkgs. 31
Brisbane, 4 c. 25
**Salammoniac—**
Gothenburg, 1 t. 12 c. £52
Hamburg, 1 2 33
**Sulphur, Roll—**
Berbice, 25 cks. £23
**Soda Ash—**
Launceston, 31 cks. £30
Melbourne, 55 t. 2 c. 273
**Soda—**
Otago, 10 t. £140
**Sodium Bicarbonate—**
Galatz, 2 t. 6 c. £12
**Salts of Soda—**
Montreal, 7 cs. £92
**Tartaric Acid—**
Melbourne, 10 pkgs. £80
Sydney, 5 c. 43
Natal, 2 17
Auckland, 4 33
Brisbane, 5 cs. 48

## LIVERPOOL.

*Week ending May 30th.*

**Ammonia Muriate—**
Melbourne, 10 c. £10
**Ammonia Carbonate—**
Genoa, 1 t. 8 c. 1 q. £48
Leghorn, 14 2 27
Venice, 5 2 10
Philadelphia, 4 149
Matanzas, 3 8
Vigo, 2 1 1 58
**Ammonia Sulphate—**
Demerara, 62 t. 12 c. 0 q. £768
Nantes, 45 5 2 502
Valencia, 70 6 2 744
**Alum—**
Beyrout, 2 t. 10 c. £15
Melbourne, 1 19 12
Geelong, 7 40
Galatz, 5 30
Algiers, 2 9
Alexandria, 15 14 1 q. 94
Volo, 1 19 9
Venice, 5 24
Rio Grande do Sul, 3 t. 9 c. 17
Valparaiso, 1 9 7
**Acetic Acid—**
Vera Cruz, 3t. 4 c. 3 q. £27
**Aluminous Cake—**
Calcutta, 11 t. 10 c. £34
**Arsenic Acid—**
New York, 2 t. 2 c. 1 q. £35
**Ammonia Liquid—**
Vera Cruz, 6 c. £12
**Alkali—**
Boston, 79 tcs.
Philadelphia, 35
**Borax—**
Rotterdam, 1 t. 19 c. £65
New York, 23 7 721
Montreal, 3 10 2 q. 110
Antwerp, 3 cks. 48
Valparaiso, 2 c 4
**Bones—**
Rouen, 10 t. 12 c. £21
**Bauxite—**
Philadelphia, 12 t. 15 c. £22
**Bisulphite of Lime—**
Sydney, 1 t. 11 c. 2 q. £13
**Boracic Acid—**
Hamburg, 2 cks. £34
**Bleaching Powder—**
Boston. 714 cks. 100 dms.
Calcutta, 1 pkg.
Genoa, 23 pps.
Oporto, 5 7 brls.
Montreal, 43 cks.
Rouen, 14
Venice, 21 15 brls. 10 pps.
**Copper Sulphate—**
Rouen, 11 t. 6 c. 2 q. £102
Montreal, 7 10 2 154
Nantes, 73 6 1,319
Bahia, 5 1 6
Dunkirk, 2 13 3 57
Ghent, 2 3 3 48
New Orleans, 10 2 3 210
Bordeaux, 100 18 1 2,220
Talcahuano, 2 10 58
Singapore, 10 1 209
St. John, 10 11
**Charcoal—**
Rouen, 7 t. 19 c. £13
New York, 13 8 54
**Cream Tartar—**
Halifax, 1 t. 2 c. £133
**Chemicals** *(otherwise undescribed)*
Alexandria, 1 t. 10 c. £64
Havre, 100 14 741
Santander, 1 2 q. 13
Rotterdam, 21 6 145
Monte Video, 2 13 1 20
New York, 4 10
Capetown, 6 2 16
**Calcium Chloride—**
Rouen, 15 t. 16 c. £128
**Caustic Potash—**
Calcutta, 2 t. 2 c. £38
Hamilton, 12 12
Melbourne, 1 20
**Copper Precipitate—**
Naples, 21 t. £600
**Carbolic Acid—**
New York, 7 t. 17 c. £720
Philadelphia, 16 3 q. 74
Genoa, 4 28
Leghorn, 1 1 109
Rouen, 1 2 2 136
**Copperas—**
Quebec, 13 t. 1 c. 1 q. £24
Constantinople, 2 2 1 5
Calcutta, 10 19 3 20
**Carbolic Powder—**
Hamburg, 10 t. 9 c. 1 q £680
**Citric Acid—**
Valparaiso, 2 c. £18
**Cobalt Oxide—**
Antwerp, 1 bx. £6
**Caustic Soda—**
Alexandria, 36 dms.
Algoa Bay, 4 cs.
Algiers, 25
Amsterdam, 75
Ancona, 7
Antwerp, 23 brls. 54
Bahia, 10 kgs. 75
Barcelona, 90 cks. 397
Bari, 46
Bilbao, 131
Boston, 200
Brisbane, 10 bxs. 8
Calcutta, 237
Ceara, 50
Copenhagen, 4
Genoa, 170
Hamburg, 147 kgs. 33
Leghorn, 40
Lima, 20
Maranham, 10 cks.
Melbourne, 30 pkgs. 112
Messina, 105
Monte Video, 15
Montreal, 715
Nantes, 18
New York, 721
Odessa, 375
Oporto, 65
Passages, 210
Philadelphia, 230 126 brls.
Port Natal, 9 bxs.
Rotterdam, 41
Rouen, 66 30 cks.
St. John, N.B. 50
Santos, 6
Seville, 450 50
Smyrna, 200
Sydney, 4 bxs.
Syra, 60
Talcahuano, 55
Tarragona, 16 brls. 30
Valencia, 25 27
Valparaiso, 182
Yokohama, 140
**Disinfectant—**
Calcutta, 13 c. £8
Bombay, 2 t. 10 14
**Disinfecting Powder—**
Bombay, 19 t. 3 c. £210
**Disinfecting Fluid—**
Bombay, 1 t. 9 c. £40
**Dried Blood—**
Grand Canary, 2 t. 4 c. £15
Barbadoes, 53 1 3 q. 366
**Epsom Salts—**
Rio Janeiro, 80 kgs.
**Glycerine—**
New York, 10 t. £325
Valparaiso, 3 c. 2 q. 16
**Guano—**
Valencia, 250 t. £2,000
**Hydroleine—**
New York, 4 t. £46
**Iodine—**
New York, 18 brls. £1,170
**Magnesium Chloride—**
Rouen, 5 t. 12 c. £44
**Manure—**
Nantes, 20 t. £7
Grand Canary, 2 2 c. 1 q. 16
**Muriatic Acid—**
Callo, 3 c. 2 q. £7
**Magnesia—**
Philadelphia, 30 cs.
**Nitric Acid—**
C. C. Castle, 5 c. £30
**Oxalic Acid—**
Trieste, 2 t. 5 c. 2 q. £54
**Oxalate Potash—**
Lisbon, 6 c. £8
**Potassium Chlorate—**
Hamburg, 2 t. 10 c. £137
New York, 2 10 128
Antwerp, 2 10 137
Oporto, 10 25
Genoa, 6 22
Philadelphia, 2 10 125
Bilbao 1 1 58
**Potassium Sulphate—**
Demerara, 5 t. 4 c. 2 q. £63
**Potassium Prussiate—**
Rouen, 6 t. 3 c. 3 q. £321
Rio de Janeiro, 10 37
**Potassium Bichromate—**
Rouen, 11 t. 12 c. 2 q. £390
Nantes, 3 cks. 49
Genoa, 5 150
**Picric Crystals—**
Hamburg, 2 t. 6 c. 3 q. £360
New York, 3 1 30
**Potashes—**
Palermo, 2 t. 8 c. £66
Rosario, 3 3 q. 5
Melbourne, 6 140
**Pearl Ashes—**
Hamburg, 3 c. 3 q. £8
**Phosphorus—**
Buenos Ayres, 1 t. 6 c. £175
**Pitch—**
Monte Video, 30 brls.
Cette, 1,645 t.
**Saltpetre—**
Grand Canary, 1 t. £18
Syra, 4 10 c. 97
Maceio, 1 11 1 q. 34
Montreal, 10 11
**Sodium Nitrate—**
Alicante, 1 t. 10 c. 3 q. £15
Grand Canary, 12 6
Valencia, 6 11 3 67
Leghorn, 6 11 3 64
**Sulphur—**
Rouen, 10 t. £50
Maceio, 10 c. 2 q. 6
Lima, 1 10 13
Rosario, 17 7
Para, 4 13
**Salammoniac—**
Patras, 3 c. 1 q. £3
Boston, 6 t. 0 2 241
Piræus, 3 1 6
Vera Cruz, 2 2 5
**Sodium Bichromate—**
Rouen, 5 t. 9 c. 3 q. £156
**Sulphuric Acid—**
Callao, 96 glns. £12
**Saltcake—**
Baltimore, 109 t. 15 c. £99
**Sodium Chlorate—**
Vera Cruz, 5 c. 1 q. £13
**Stannate of Soda—**
Genoa, 7 c. £3
**Sheep Dip—**
Buenos Ayres, 15 t. 11 c. 2q. £308
East London, 6 2 11
Natal, 500 dms. 107
**Soap Powder—**
Sydney, 12 t. 8 c. 2 q. £432
**Sodium Carbonate—**
Boston, 56 brls.

**Salt—**
Amsterdam, 173 t.
Antwerp, 300
Archangel, 400
Baltimore, 90
Bathurst, 175
Benin, 20
Boca, 31
Boston, 469
Calcutta, 3,160
Chicago, 65
Demerara, 75
Ghent, 60
Gothenburg, 29
Halifax, 1,150
Kingston, 50
Milwaukee, 65
Montreal, 1,108
New York, 2,128
Old Calabar, 20
Opobo, 90
Para, 50
Pillau, 927
Pugwash, 530
Quebec, 1,191
Quitta, 12
Rosario, 12
Rotterdam, 148
Stockholm, 411
St. Paulo, 110
Sherbro', 30
San Francisco, 293
Schelpino, 450
Sydney, 1,010
Vadsoe, 500
Vardo, 440
Winnipeg, 34

**Soda Ash—**
Baltimore, 27 cks.
Boston, 130 tcs. 248
Genoa, 10
Maranham, 80 brls.
Melbourne, 43 73
Mitylene, 50
New York, 228 tcs. 53
Oporto, 8 brls. 20 5
Philadelphia, 217
Rio Janeiro, 200 brls.
Rosario, 50
Seville, 12
Smyrna 490
Vera Cruz, 2 cks.

**Sodium Bicarbonate—**
Antwerp, 200 kgs.
Buenos Ayres, 20
Honolulu, 15 cks.
Leghorn, 25
Melbourne, 20 655
Nantes, 25
Naples, 4 50
New York, 100
Rotterdam, 5 25
Rouen, 34 brls.

**Sodium Silicate—**
Ancona, 5 brls.
Bilbao, 16 cks.
Lisbon, 16
Malaga, 3
Melbourne, 20
Seville, 50 brls.

**Soda Crystals—**
Boston, 280 brls.
Brisbane, 200
Buenos Ayres, 40
New York, 125 cks.
Valencia, 6

**Tartar—**
New York, 3 t. £340

**Tannic Acid—**
Lisbon, 6 c. £44

**Tartaric Acid—**
Bilbao, 2 c. £17
Melbourne, 5 47
Sydney, 5 47
Valparaiso, 3 26

## GLASGOW.

*Week ending June 2nd.*

**Acetic Acid—**
Sydney, 2 t. £35

**Alkali—**
Dunedin, 5 t. 9 c. £27

**Alum, Ground—**
Auckland, 2 t. 11 c. £15

**Bauxite, Calcined—**
Rotterdam, 167 bgs. £42

**Bauxite, Raw—**
Rotterdam, 7 bgs. £2

**Benzol—**
Dieppe, 56 cks. 10 puncheons £310
Rotterdam, 17 dms. 20 ,, 695

**Bleaching Powder—**
Sydney, 14 t. 18 c. £116
San Francisco, 33 1 258
Melbourne, 12 7 87

**Bones—**
Antwerp, 10 c. £35

**Copperas—**
Bombay, 30 t. £50

**Caustic Soda—**
Melbourne, 41 t. 14 c £314

**Dyestuffs—**
**Cochineal**
Dunedin, 2 c. £15
**Madder**
Auckland, 1 t. 16 c. £55
Melbourne, 12 29
**Dyestuffs** (*otherwise undescribed*)
Lisbon, 5 t. 10 c. £92

**Epsom Salts—**
Bombay, 9 t. £28
Quebec, 5 20
Stockholm, 19 cks. £33

**Ferromanganese—**
Halifax, 15 t. 18 c. £130

**Iodine—**
Rotterdam, 2 cks. £430

**Methylated Spirit—**
Bombay, 161 gls. £12
Dunedin, 11 c. 20

**Manure—**
**Ground Phosphate**
Hamburg, 82 t. 11 c. £405
**Basic Slag**
St. Brieux, 320 t. 4c. £160

**Manganese Oxide—**
New York, 9 t. 19 c. £75

**Nitric Acid—**
Bombay, 15 t. 17 c. £200

**Potassium Bichromate—**
Quebec, £460
Gothenburg, 1 t. 9 c. 64
Rotterdam, 5 cks. 75
Dunedin, 16 c. 32
Auckland, 1 t. 10 43
Melbourne, 19 40
Boston, 8 1 338
Antwerp, 4 19 151
New York, 54 14 2,297

**Pitch—**
Bombay, 30 t. 3 c. £47
Bordeaux, 250 150
Dieppe, 330 195
Halifax, 42 11 60
Konigsberg, 30

**Paraffin Wax—**
Melbourne, 20 t. 9 c. £312
Antwerp, 3 1 76

**Potassium Prussiate—**
New York, 15 c. £42

**Sodium Bichromate—**
Quebec, 7 6 £265
Boston, 11 0 359
New York, 9 17 322

**Soda—**
Sydney, 9 t. 16 c. £39

**Sulphuric Acid—**
Bombay, 234 t. 5 c. £1,500

**Soda Ash—**
San Francisco, 16 t. 11 c. £83
Dunedin, 10 11 40
Boston, 4 11 30

**Sodium Silicate—**
Dunedin, 18 t. 4 c. £90
Melbourne, 25 150

**Sulphur—**
Bergen, 5 cks. £5

**Tar—**
Bombay, 24 t. 14 c. £47
Singapore, 21 35
Phillipines, 11 13 52
,, 3 9 38
Dantzic, 373 450
Konigsberg, 1,054 brls.

**Tartar Crystals—**
Dunedin, 5 c. £25

**Tartar, Ground—**
Auckland, 4 t. 17 c. £20

## HULL.

*Week ending May 29th.*

**Alkali—**
Abo, 21 cks.
Stettin, 3 60 kgs.
Wasa, 7

**Ammonia Sulphate—**
Rotterdam, 60 t.
Hamburg, 40
Antwerp, 20

**Bone Size—**
Ghent, 4 cks.
Hamburg, 5
Harlingen, 22

**Brimstone—**
New York, 10 cks.

**Borax—**
Stettin, 8 cks.

**Chemicals** (*otherwise undescribed*)
Abo, 6 cks.
Antwerp, 7 2 cs. 20 pks.
Amsterdam, 1 3
Bremen, 30
Boston, 50
Christiania, 72 1
Copenhagen, 22
Genoa, 5 36 4
Hamburg, 9 36 22
Konigsburg, 2
Marseilles, 314 20
New York, 100
Rotterdam, 15 20 16
Stettin, 53
St. Petersburg, 20 100
Stockholm, 4
Wasa, 9

**Caustic Soda—**
Antwerp, 11 dms.
Christiania, 28
St. Petersburg, 35

**Dyestuffs—**
Abo, 2 cs.
Amsterdam, 6 cks.
Hamburg, 6
Rotterdam, 1 cs.
Stettin, 172 bgs.

**Manure—**
Antwerp, 2,185 bgs.
Esbjerg, 300 sks.
Hamburg, 801 bgs.
Marseilles, 1,436
Stettin, 259

**Pitch—**
Antwerp, 900 t.
Dunkirk, 46
Genoa, 208
Naples, 202

**Tar—**
Amsterdam, 1 ck.

## TYNE.

*Week ending June 2nd.*

**Antimony—**
New York, 60 t.

**Alkali—**
Christiania, 40 t. 8 c.
Hamburg, 1
Rotterdam, 2 11
Barcelona, 27 18
Amsterdam, 79 15
Copenhagen, 4 4

**Arsenic—**
Barcelona, 1 t. 3 c.
Venice, 19

**Ammonia Carbonate—**
Barcelona, 10 c.

**Aluminous Cake—**
Quebec, 13 t. 1 c.

**Alumina Sulphate—**
Quebec, 6 t. 12 c.

**Bleaching Powder—**
New York, 178 t.
Christiania, ·17 5 c.
Antwerp, 103 16
Terneuzen, 5 3
Hamburg, 74 19
Konigsberg, 2 15
Newfairwater, 20 7
Rotterdam, 96 3
Quebec, 30 12
Amsterdam, 516 10
Copenhagen, 26
Venice, 21 11
Newfairwater, 10 13
Norrkoping, 32 6
Christiania, 3 15

**Caustic Soda—**
New York, 125 t. 7 c.
Antwerp, 10 9
Hamburg, 10 4

**Caustic Soda—***continued.*
Barcelona, 14 t. 9 c.
Venice, 1 3
Copenhagen, 5 11

**Copperas—**
Aarhuus, 5 t. 6 c.
Amsterdam, 3 2

**Creosote—**
Copenhagen, 5 t. 13 c.

**Chemicals** (*otherwise undescribed*)
Copenhagen, 1 t. 5 c.

**Flint, Ground—**
Antwerp, 340 t.
Stavanger, 2

**Litharge—**
Antwerp, 1 t. 13 c.
Hamburg, 4 15
Aarhuus, 3
Quebec, 6
Copenhagen, 6

**Magnesia—**
Barcelona, 7 t. 16 c.

**Phosphorus—**
Malmo, 6 c.

**Potassium Chlorate—**
Gothenburg, 6 t.
Rotterdam, 1 13 c.
Amsterdam, 5

**Pitch—**
Barcelona, 20 t.

**Soda—**
New York, 112 t. 10 c.
Amsterdam, 42 17
Antwerp, 17 7
Copenhagen, 1 12
Terneuzen, 5 4
Odense, 16 16
Esbjerg, 2 3
Venice, 96 3
Aarhuus, 143 12
Gibraltar, 8 2
Aalborg, 3 18
Norrkoping, 32 6
Rotterdam, 22 6
Christiania, 1 18
Ystad, 114
Quebec, 47 18
Montreal, 286 12

**Soda Ash—**
New York, 516 t. 4 c.
Christiania, 10 9
Hamburg, 9 19
Newfairwater, 20 17
Montreal, 2
Amsterdam, 1 16
Copenhagen, 5 4
Venice, 45 9
Christiania, 25 11

**Superphosphate—**
Aarhuus, 100 t.

**Sodium Bicarbonate—**
Rotterdam, 1 t. 7 c.
Amsterdam, 3 15
Copenhagen, 2 4

**Sodium Sulphate—**
Copenhagen, 17 t. 4 c.

## GOOLE.

*Week ending May 30th.*

**Ammonia Sulphate—**
Rotterdam, 30 t.

**Benzol—**
Antwerp, 23 cks.

**Creosote—**
Alicante, 1,200 cks.

**Chemicals** (*otherwise undescribed*)
Calais, 20 cks.
Ghent, 1 cs.
,, 14 cks.

**Coal Products—**
Ghent, 32 cks.

**Pitch—**
Antwerp, 356 t.

## GRIMSBY.

*Week ending June 2nd.*

**Chemicals** (*otherwise undescribed*)
Antwerp, 6 cks.
,, 2 pkgs.
Dieppe, 1 ck.
Rotterdam, 15 dms.

# PRICES CURRENT.

[THURSDAY, June 7, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... ... ... ... ... ... per cwt. | 0 | 8 | 3 |
| ,, Glacial ... ... ... ... ... per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° ... ... ... ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... ... ... ... ... per lb. | 0 | 0 | 6 |
| Fluoric ... ... ... ... ... ... ,, | 0 | 0 | 3¾ |
| Muriatic (Tower Salts), 30° Tw. ...per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... ... ... ... ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ... ... ... ... ... ,, | 0 | 0 | 2 |
| Oxalic ... ... ... ... ... ... ,, | 0 | 0 | 3 |
| Picric ... ... ... ... ... ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... ... per ton | 15 | 0 | 0 |
| ,, (monohydrate) ... ... ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ... ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) ... ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... ... ... ... ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ... ... ... ... ... ,, | 0 | 1 | 6 |
| Arsenic, white powdered... ... ... ... per ton | 11 | 15 | 0 |
| Alum (loose lump) ... ... ... ... ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ... ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, ·880=28°... ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, =24°... ... ... ... ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ... ... ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... ... ... ... ... per ton | 22 | 0 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... ... ... ... ... per ton. | 42 | 10 | 0 |
| ,, ,, (pure) ... ... ... ,, | 71 | 10 | 0 |
| ,, Phosphate ... ... ... ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 11 | 15 | 0 |
| ,, ,, (grey), Hull ... ... ,, | 11 | 15 | 0 |
| Aniline Oil (pure) ... ... ... ... ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ... ... ... ... ,, | 0 | 0 | 8½ |
| Antimony ... ... ... ... ... ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... ... ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... ... ... ... ... per ton | 7 | 5 | 0 |
| ,, Carbonate (native) ... ... ... ,, | 4 | 15 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 %... ... ... ... ,, | 7 | 7 | 6 |
| ,, Liquor, 7 % ... ... ... ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ... ... ... ,, | 11 | 10 | 0 |
| Calcium Chloride ... ... ... ... ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ... ,, 16/- to 32/- | | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... ... ... per lb. | 0 | 0 | 9 |
| Magenta ... ... ... ... ... ... ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 5 |
| Benzol, 90 % nominal ,, ... ...per gallon | 0 | 2 | 4 |
| ,, 50/90 ,, ... ... ,, | 0 | 2 | 3 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 2 |
| ,, (crude 60°) ... ... ...per gallon | 0 | 3 | 11 |
| Creosote (ordinary) ... ... ... ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 2 |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 1 |
| Grease Oils, 22° Tw. ... ... ... ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 13 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) ... ... ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... ... ... ... ... per ton | 83 | 0 | 0 |
| ,, Sulphate ... ... ... ... ... ,, | 21 | 10 | 0 |
| ,, Oxide (copper scales) ... ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ... ... ... ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ... ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ... ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ... ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ... ... ... | 13 | 10 | 0 |
| ,, Litharge Flake (ex ship) ... ... ,, | 15 | 0 | 0 |
| ,, Acetate (white, ,, ) ... ... ,, | 25 | 10 | 0 |
| ,, ,, (brown, ,, ) ... ... ,, | 20 | 15 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 10 | 0 |
| ,, Nitrate ... ... ... ... ... ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) ... ... ... ... ,, | 7 | 17 | 6 |
| ,, ,, (grey) ... ... ... ... ,, | 12 | 0 | 0 |

| | £ | s. | d. |
|---|---|---|---|
| Magnesium (ribbon and wire) ... ... per oz. | 0 | 2 | 3 |
| ,, Chloride ... ... ... ... per ton | 2 | 7 | 6 |
| ,, Carbonate ... ... ... ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... ... ... ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ... ... ... ,, | 17 | 10 | 0 |
| ,, Borate ... ... ... ... ... per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % ... ... ... ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ... ...per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent ... ... ... ,, | 0 | 3 | 10 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 5 | 0 |
| **Oils:—** | | | |
| Castor ... ... ... ... ... ... ... per cwt. | 1 | 3 | 0 |
| Cotton-seed ... ... ... ... ... ... per ton | 21 | 10 | 0 |
| Linseed ... ... ... ... ... ... ... ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ... ...per gallon | 0 | 0 | 6 |
| ,, American ... ... ... ... ,, | 0 | 0 | 6⅛ |
| Potassium (metal) ... ... ... ... ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... ... ... per ton | 16 | 7 | 6 |
| ,, Chlorate... ... ... ... ... per lb. | 0 | 0 | 5¾ |
| ,, Cyanide, 98 % ... ... ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) ... ... ... per cwt. | 1 | 2 | 9 |
| ,, Permanganate ... ... ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... ... ... per lb. | 0 | 0 | 6⅝ |
| ,, Sulphate, 90 % ... ... ... per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % ... ... ... ,, | 7 | 15 | 0 |
| Silver (metal) ... ... ... ... ... ... per oz. | 0 | 3 | 6½ |
| ,, Nitrate ... ... ... ... ... ... ,, | 0 | 2 | 7½ |
| Sodium (metal)... ... ... ... ... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 12 | 6 |
| ,, ,, (Soda Crystals) ... ... ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ... ... ,, | 21 | 0 | 0 |
| ,, Chlorate ... ... ... ... ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... ... ... ... per ton. | 30 | 0 | 0 |
| ,, Bichromate ... ... ... ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda)... per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 3 | 9 |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 11 | 3 |
| ,, Bicarbonate ... ... ... ... ,, | 5 | 0 | 0 |
| ,, Hyposulphite ... ... ... ... ,, | 5 | 10 | 0 |
| ,, Manganate, ... ... ... ... ,, | 6 | 15 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | 0 |
| ,, Nitrite, 98% ... ... ... ... per ton | 28 | 0 | 0 |
| ,, Phosphate... ... ... ... ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... ... ... ... ... per lb. | 0 | 0 | 5½ |
| ,, Silicate (glass) ... ... ... ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 2 | 6 |
| ,, Sulphate (Salt-cake)... ... ... ,, | 1 | 0 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 10 | 0 |
| ,, Sulphide ... ... ... ... ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ... ... ... ... ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % ... ... ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... ... ... ... ... ... per cwt. | 0 | 13 | 3 |
| ,, Cane ... ... ... ... ... ... ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium ... ... ... per lb. | 0 | 0 | 7½ |
| ,, Barium ... ... ... ... ,, | 0 | 0 | 5 |
| ,, Copper, 60% ... ... ,, | 0 | 0 | 8 |
| Sulphur (Flowers) ... ... ... ... ... per ton | 8 | 5 | 0 |
| ,, (Roll Brimstone) ... ... ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 1 | 3 |
| Superphosphate of Lime (28 %) ... ... ,, | 2 | 5 | 0 |
| Tallow ... ... ... ... ... ... ... ,, | 26 | 0 | 0 |
| Tin (metal) ... ... ... ... ... ... ,, | 85 | 0 | 0 |
| ,, Crystals ... ... ... ... ... ... per lb. | 0 | 0 | 6¾ |
| Zinc (Spelter) ... ... ... ... ... ... per ton | 16 | 5 | 0 |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 2 | 6 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, June 16, 1888.**


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## "TECHNICAL INSTRUCTION."

THE Bill now before Parliament defines what is meant by "technical education," and by this we infer it is the same subject as that of "technical education," which has served many a political orator with a theme when his ordinary sources of political information have run dry.

The definition to which we allude is no hasty conclusion, no ill-considered explantion of the stump orator, but a carefully drafted clause of the Technical Instruction Bill, backed with the names of Sir William Hart Dyke, Sir Michael Hicks-Beach, and Mr. Jackson. The sixth section of the Bill read thus:—"The expression, 'technical instruction,' means instruction in the principles of science and art applicable to industries and in the application of special branches of science and art to specific industries or employment."

With the general provisions of the Bill we have but little interest, except that we believe that if the Bill becomes law it will only add to the burdens of an already overtaxed population without securing any adequate return.

We strongly object to the question being left in the hands of local School Boards, and thus to the whims and fancies of local agitators who, for political, municipal, or pecuniary considerations achieve that which suits them best personally. The question is not a local one; it is a national question of grave importance, if we may judge the matter by the utterances of some of our public speakers, and to deal with it locally is only tinkering with the disease, healing over an old sore which will most assuredly break out in some other form more strongly than ever.

The question is—Have local councils ever met any great question with that amount of tact and intelligence necessary for dealing with a matter of magnitude? The answer must be in the negative, and the proof may be found in sewage schemes, the Smoke Acts, river pollution, and many other things too numerous to mention. Even the School Boards of various districts have carried on their business in a most extravagant and ineffective manner.

We are told that foreign competition is due to the absence of technical instruction from our educational system, and are mildly asked to entrust the vital question of putting all in order again to—School Boards.

The suggestion is too ridiculous.

The Bill goes on to say:—"It does not include teaching the practice of any trade, or industry, or employment," so that the work contemplated by the Bill as being necessary is narrowed to the straightest limits. According to clause 2, section 1, and the schedule, a student can be admitted to "technical instruction" if he can read a passage from some standard author, pass an exercise in dictation, work fractions, vulgar and decimal, simple proportion, and simple interest. Really this is too ludicrous. One would have thought that before admission to a form of instruction which is supposed to be now unattainable, it would have been a *sine qua non* that the student should know at least the elements of all that was attainable; but to think of passing a student into, say technical chemistry, without knowing the elements of chemistry is, to say the least of it, absurd, and shows that the drafters of the Bill have mistaken their vocation.

Anyhow, we now know what is meant by technical instruction according to the sixth section of the Bill, and leaving all other industries to look after themselves, we shall refer to the subject only from the standpoint of the chemical industries.

As the Bill does not contemplate "teaching the practice of any trade or industry," it is clear that those responsible for the Bill have discerned the best place for attaining this is

the workshops and the works, and of that there can be little doubt, as the teaching of a handicraft as a handicraft can only be carried out on a commercial basis, and a clever apprentice or pupil *will* always progress in spite of the many obstacles that are often thrown in his way.

To a lad who identifies himself with the excellence of his work, there is no barrier in commerce or trade, but when instruction is meted out as it is in many of our schools and colleges, it ought not to be wondered at that so many pupils are spoiled. In a good workshop, application brings its own reward, the employer being only too anxious for his own sake to advance his pupil. But this is not always the case where the employer is not in touch with his employés, a subject we shall mention in due course.

We may now turn to the various views that are held respecting technical education. The workman thinks, if he thinks at all, that it signifies the teaching practically of certain trades, but according to the Bill before us this is expressly forbidden, so that the student will not be able to indulge in a little alkali making, or in the manufacture of coal-tar colours, or even in coal-tar distilling; all he will be entitled to learn will be the application of "the principles of science and art" to these industries. In fact, many workmen are wondering what all the fuss is about and how many dimes will fall to their share after the generals have succeeded in dividing the plunder.

To those manufacturers in favour of the Bill with whom we have spoken—and we must confess to meeting with a majority of dissentients—the subject appears as a means of getting their work done by the workman in a better manner than at present. We believe this to be the greatest fallacy ever retained by any body of sensible men. The fault at present does not lie with the workman, but with the manufacturer, the professor, and above all, with those educational establishments and bodies which have the appointment of professors, and to delegate these appointments to ordinary School Boards is indeed most amusing.

To our mind, the technical instruction question lies in a nutshell. Our impression is that the heads of some of the educational establishments in this country are beginning to find out that the men educated in their establishments do not always find more favour than he who has received an outside training and who has had experience in works' manipulations. As a consequence of this there is not a sufficient outlet for the vast number of pupils that are annually being turned out, and some effort must be made to turn the channel into the desired bed.

Whatever system of instruction be adopted, it must not be forgotten that a works carried on in any chemical industry requires two classes of chemists, the high-class man of intelligence, *nous* and ready for any emergency, and the plodder—bottle-washer if you like so to call him—who can only do what he is told, but does that well. All systems of instruction will produce ten of the latter to one of the former. Any idea of a successful scheme of education, whether technical or otherwise, seems to us to be to tempt the man of energy and resource from the ranks of the plodders, and when he is discovered, improve him; but do not endeavour to improve all round, for there is no man living, or ever will live, who can suppress individuality and the ambition consequent thereupon.

We do not speak without experience. It has been our lot during the past twenty years to encounter the majority of those interested and employed in the conduct of nearly all the chemical industries of the United Kingdom, and judging from that experience, we say most emphatically that the present Bill is a delusion and a snare, and will no more protect the interests of British trade and commerce than it will cause the return of those vast industries which we fear have left our shores for ever.

The remedy seems to us very easy. We require no special enactment for teaching "the principles of science and art applicable to industries;" we only require pressure brought to bear on those educational bodies which have endeavoured to teach science and have not been able to do it properly, to do their duty. The Technical Education Bill is to enable the principles of science and art applicable to industries to be taught. Is there no one attempting to do this now in our many educational establishments and without a special Act of Parliament?

As we have said before, the fault lies mainly with the existing educational bodies; they have been supposed to teach "the principles of science and art," and if they do not exercise this important function the public should know the reason why.

We anticipate the answer to the question will be—want of funds, and therefore inform our readers that the Bill provides a method of raising the wind by a local rate which "shall not exceed the sum of one penny in the pound." Judging from what has been done during the past few years, we are very curious to know how such a rate will be spent in the event of the Bill becoming law, but we venture to predict that the bulk of the money will be sifted through a hurdle by the builders, architects, surveyors, and lawyers, and should perchance any loose pieces stick to the bars of this rather coarse sieve it might possibly fall to the lot of the chemical instructor.

We believe the great educational establishments have attempted to teach the principles of chemical technology but with faulty material, material quite unsuited to the work in hand, and therefore failure has resulted. But, it might be urged, Where are these good technical chemists to be found? they are scarce. Our reply is Germany found Dr. A. W. Hoffman teaching chemistry at the college of chemistry in Oxford-street, and Switzerland found Dr. George Lunge managing the Tyne Alkali Company at Newcastle. As the Yankee said "they are not to be found sitting on an empty barrel whittling a stick for the sake of something better to do," neither will they be forthcoming at the starvation salaries which are generally offered them.

Where has there been an appointment to any chair of technical chemistry in this country characterised by the selection of a candidate for his proved and undoubted technical ability? Echo, answers—Where.

Where are the professors of technical chemistry in this country who are able to teach "the principles of science and art applicable to industry?" and when found, What is their status compared with the ordinary teaching staff?

It has been the fashion in some quarters to regard it a *sine qua non* that teachers should emanate from one of the universities. Mr. Mundella's thoughts on this subject may not be without interest in this connection. He said at a meeting of the Teachers' Training College:—"The assumption that anyone trained at Eton and Oxford was qualified to teach higher schools was one of the superstitions of the past. He could vouch, from his own experience, that men who had had the highest education, who had distinguished themselves in the first rank of the universities, and who subsequently had entered upon the career of school inspectors—officials who merely asked questions and did not impart instruction—had sometimes succeeded in making more human beings miserable than any other members of the Civil Service could possibly do."

Is it not a fact well known to every chemist that the majority of teachers of technical chemistry only receive from the teaching institutions, sums utterly insufficient to keep body and soul together, and that they have to rely upon outside work to enable them even to appear in public respectably. How can a man whose attention is riveted on the receipt of fees from the outside pay that attention to his pupils that he ought to do?

There is only one way out of the present difficulty, and that is a complete revision of our present system. Professors of technical subjects should be selected for the reason that they know something of the subjects they have to teach. They should be salaried sufficiently to allow them to live comfortably without the aid of outside work, which should in all cases be prohibited; and lastly, even research work should be prohibited, unless it be performed in the general laboratory for the instruction of the students. And furthermore, unless the technical professor and the professor of pure science be placed on a footing of equality, we fear there is no hope for industrial science in this country.

Having now taken a general survey of the whole question, we may now subdivide it, and during the next few weeks will endeavour to devote a portion of our space to a consideration of The Professor and the Student—The Chemist and the Manufacturer—The Workman and Technical Instruction.

# CHEMICAL ENGINEERING.*

V.

## Materials used in the Construction of Plant and Apparatus.

WE now come to the second letter of the chemical engineer's alphabet, and in dealing with the materials used in the construction of plant and apparatus must necessarily go over much ground that has been trodden before, nevertheless, if old matter is simply culled and placed in a form that it can be readily utilised it will be doing some good.

Of all the substances used in the construction of chemical plant there are but two, viz., timber and stone, that require little or no preparation ere they can be fashioned by the workman.

**Timber** is of very various kinds, and all are not equally useful in the construction of works' apparatus, wherein chemical substances are manipulated. Pitch pine and deal are, perhaps, more extensively employed in this connection than any other kinds of wood, but elm and oak very often find application for a variety of purposes. Ash finds employment for handles of scoops, picks, and such like purposes, while beech is by no means a neglected source of supply.

In the construction of absorbing and denitrating towers, vitriol chambers, the manganese recovery plant, and all such apparatus placed out in the open air and exposed to the weather good sound timber is required, and as much of it has to sustain very heavy weights, it is well to know how the various dimensions required can be calculated. We may, however, first start with a short table of the various properties of several varieties of timber.

**Table I.**

| Description. | Sp. gr. | Weight of one cubic foot in lbs. | Tensile strength, lb. per sq. inch. | Crushing strain, lb. per sq. inch. | Transverse strength cwts. K. |
|---|---|---|---|---|---|
| Ash | ·72 | 45 | 14,000 | 9,300 | 19 |
| Beech | ·69 | 43 | 11,000 | 7,700 | 13 |
| Birch | ·72 | 45 | 14,000 | 3,300 | 17 |
| Elm | ·55 | 34 | 13,000 | 10,300 | 8 |
| Deal | ·69 | 43 | 12,000 | 5,800 | 12 |
| Fir | ·52 | 32 | 10,000 | 6,000 | 11 |
| Oak | ·77 | 48 | 10,000 | 6,500 | 14 |
| Pine (red) | ·57 | 36 | 12,000 | 5,400 | 12 |
| ,, (white) | ·43 | 27 | 9,000 | 5,400 | 11 |
| ,, (pitch) | ·66 | 41 | 12,000 | 6,000 | 14 |

Red deal and pitch pine timbers are often employed as supports for tanks overhead, such as for the neutralised liquor settlers of a manganese recovery plant. It is therefore imperative to be able to calculate without any fear of mishap what a beam or column of any given size will carry. This may be done by the aid of the following formulæ:—

$$W = 8 \frac{D^4}{L^2}$$

where W = the breaking weight in tons.
,, D = the side of a square beam in inches.
,, L = the length of the timber in feet.

But in order to apply this formula to actual practice a further correction is necessary. The above formula gives the *breaking* weight, whereas what we require is the *safe load* such a beam will carry, and it has been ascertained by experience that in timber structures, not more than one-fifth of the breaking weight in a dead load should be attempted to be carried, whilst if the load is in motion, one-tenth of the breaking weight only should be superposed. The student will now be able to calculate the maximum size of vitriol tanks which should be placed on the top of a vitriol absorbing tower 50ft. high, built in the ordinary manner with four 12in. square posts.

When timbers are disposed horizontally and are made to bear great weights, it is also possible to calculate to a nicety the safe load they should be made to carry, and in this case much depends on the manner of the building, and whether the loading is equal or unequal. If the weight or load is equally distributed, the safe load will be double that which it would be if the beam was only loaded in the centre. This is supposing that both ends of the beam are well supported, while if both ends are fixed firmly and the weight distributed, the simple fixing of the ends will raise the safe load to nearly double its former capacity. The following formula will give the breaking weight of rectangular beams:—

$$(a)\ W = \frac{4\,K\,B\,D^2}{L}$$

$$(b)\ W = \frac{8\,K\,B\,D^2}{L}$$

$$(c)\ W = \frac{16\,K\,B\,D^2}{L}$$

*(a)* The ends supported with weight in centre.
*(b)* The ends supported, the weight distributed.
*(c)* The ends fixed and the weight distributed.

In this formula:—
W = The breaking weight in cwts.
K = The transverse strength in cwts. from Table I.
B = The breadth of the beam in inches.
D = The depth of the beam in inches.
L = Span of beam in inches.

If the beam is fixed at both ends and loaded in the middle, the following formula will be found useful:—

$$W = \frac{6\,K\,B\,D^2}{L}$$

$$L = \frac{6\,K\,B\,D^2}{W}$$

$$B = \frac{L\,W}{6\,D^2\,K}$$

$$D = \sqrt{\frac{L\,W}{6\,B\,K}}$$

These formulæ which have only been slightly altered from those given in Barlow's "Strength of Materials" will be found quite safe for use even in chemical works where the conditions are severe, for it must not be forgotten that extra strength will have to be often given where beams are subject to overflows of liquor, to heat, or to the action of corrosive gases. Of course common sense tells us that where materials are subject to corrosive action a selection of some non-corrosive element is desirable, but unfortunately this is not always possible.

Timber is largely employed for the construction of tanks, which are often used to contain slightly acid or neutral liquors, and for this purpose pitch pine is not much acted upon, and even red deal will last a very long time if always kept wet; alkalis, however, have a very strong action upon timber, or rather upon the resinous intercellular matter, so that a process of disintegration is soon set up.

Square or rectangular wooden tanks are difficult to keep tight, they are generally bolted together with iron bolts, but any leakage which takes place results in the destruction of the ironwork, so that wherever such is admissible, wooden tanks are lined with lead, and even for some operations with copper. A better plan, however, is to construct all wooden vessels of circular form after the fashion of a brewer's vat; they are then easily kept tight, and are also easily repaired. They are made of slightly larger diameter at the bottom than the top, and the joints drawn together with strong iron hoops.

The action of heat, and the alternations of moisture and dryness must not be overlooked. In the matter of timber a constant heat of less than 120° C. will in time completely destroy the tenacity of the hardest timber, reducing it to the state of tinder, so that some other material should be employed when required for such situations.

The employment of ash for pick and scoop handles, oak staves for wet cooperage, elm planks for the sides and bottoms of barrows, sycamore for other special purposes scarcely needs any special notice, still these things should be borne in mind by all who have to provide and use these articles.

**Stone** is the other material which Nature provides for the constructor of chemical apparatus, needing but little if any preliminary treatment. Stone is very extensively employed in the construction of chemical vessels on account of the small action that acids have upon some qualities of it, but as some kinds are very energetically attacked, it behoves us to look very carefully into the various qualities and to examine

* A course of lectures delivered by Mr. George E. Davis at the Manchester Technical School.—*All rights reserved.*

the physical and chemical characters. Stone is also used largely for engine beds, for the pedestals of acid towers, and to sustain the end of pillars, columns, etc., therefore the following table will no doubt be found useful:—

**Table II.**

| Description. | Locality. | Crushing weight in tons per sq. inch. | Sp. gr. |
|---|---|---|---|
| Chalk | Sussex | 0·22 | 2·42 |
| Granite | Mount Sorrel | 5·35 | 2·67 |
| Limestone | Buxton | 3·39 | 2·60 |
| Marble | Devonshire | 3·39 | 2·70 |
| Stone | Portland | 1·87 | 2·42 |
| Sandstone | Cheshire | 1·00 | 2·16 |
| ,, | Bramley Fall | 2·67 | 2·50 |
| ,, | Southowram | 2·54 | 2·51 |
| Slate | Llanberis | 5·00 | 2·78 |

The employment of chalk, limestone, and marble is of course out of the question for most purposes of the chemical manufacture, seeing that they are entirely dissolved even by very dilute acids; but there are some stones, notably those called "Yorkshire landings," which stand the action of even concentrated acids. The two following analyses are of samples of Yorkshire stone such as is used in chemical works:—

| | (1) | (2) |
|---|---|---|
| Silica | 86·52 | 80·50 |
| Alumina | 7·36 | 11·25 |
| Oxide of iron | 1·54 | 3·60 |
| Lime | 1·08 | 0·61 |
| Magnesia | traces. | 0·12 |
| Manganese | traces. | traces. |
| Sulphuric acid | 0·45 | 0·77 |
| Carbonic acid | 0·60 | none. |
| Water | 1·88 | 2·64 |
| Ferrous sulphide | none. | traces. |

Stone may be able to stand the action of acids extremely well but may yet have its defects, and the two analyses already quoted are not given to show the chemical composition of an absolutely perfect stone, so much as to call attention to some impurities existing therein, and which give rise to some peculiarities. In No. 1 small quantities of lime and carbonic acid are shown—not enough the casual observer would say to interfere with its being considered of good quality, but in practice it was found that even this small quantity of carbonate of lime was detrimental. Had it been evenly distributed throughout the mass its presence might not have been injurious, but microscopical examination of the thinly prepared section showed that it existed in layers which dissolved away when the acid penetrated to them, and destroyed the cohesiveness of the whole stone to such an extent that when the cistern had been up for a time and was found leaking, on attempting to replace it by another, the whole of the material fell asunder like a pack of playing-cards. The analysis No. 2 shows the presence of another impurity, but only in traces—sulphide of iron—externally this stone did not differ much in appearance from No. 1, but a tank built of it was rapidly being destroyed by large pieces flaking off like oyster shells. This was clearly traceable to the oxidation of the small quantities of pyrites (sulphide of iron) distributed irregularly through the mass. I cite these to show how careful we should be to examine for and note the character of impurities. The main constituents are generally in sufficient quantities to take care of themselves, but the impurities are very apt to be neglected.

Stone, excepting that quality known as "firestone," does not stand heat of any considerable degree of intensity. When a stone tower or an acid cistern gets too hot a cracked stone is sure to result, and therefore gases should be cooled before placing them in contact with stone slabs. Stone tanks are usually employed with acids and acid solution, but in some instances they are used for alkalies and lime milk, but being more costly than iron it is only for certain special purposes that they are so employed, such as when contact with iron has to be avoided.

Slate has been used in several instances for small cisterns, drying shelves, and tables with much success. It possesses the following chemical composition:—

| | |
|---|---|
| Silica | 61·26 |
| Alumina | 20·49 |
| Protoxide of iron | 7·23 |
| Lime | 1·08 |
| Magnesia | 1·96 |
| Potash | 2·18 |
| Soda | 2·36 |
| Water | 3·44 |

But it will be seen that the presence of the comparatively large quantities of oxides, other than silica and alumina, renders it a not very suitable medium to employ where strong acids are present.

Clay next demands our attention, and the results of the analyses of clays and bricks used in the various chemical and allied industries will aid us in forming some conclusions as to the suitability of different kinds for specific purposes.

**Table III.**

| | Stourbridge pot-clay. | Huddersfield clay. | Dinas cement. | Red brick clay. |
|---|---|---|---|---|
| | Ignited. | Ignited. | Ignited. | Ignited. |
| Silica | 76·26 | 76·25 | 94·47 | 62·50 |
| Alumina | 21·35 | 20·39 | 3·59 | 26·27 |
| Oxide of iron | 1·60 | 2·41 | 1·08 | 8·96 |
| Lime | 0·07 | 0·71 | 0·60 | 0·84 |
| Magnesia | trace | trace | ... | 0·46 |
| Alkalies | 0·46 | 0·20 | ... | 1·00 |
| | 99·74 | 99·96 | 99·74 | 100·03 |

**Table IV.—Bricks.**

| | Stourbridge. | Garnkirk. | Dinas. | St. Day. | Staffordshire blue. | Common red. |
|---|---|---|---|---|---|---|
| Silica | 67·77 | 62·00 | 96·40 | 74·17 | 60·70 | 62·40 |
| Alumina | 29·00 | 34·52 | 2·70 | 24·00 | 24·00 | 26·46 |
| Oxide of iron | 2·70 | 2·67 | | 2·01 | 14·60 | 7·66 |
| Lime | 0·23 | 0·90 | 1·20 | 0·23 | 0·14 | 2·34 |
| Magnesia | ... | ... | ... | ... | trace | 0·14 |
| Alkalies | 0·42 | ... | ... | ... | 1·00 | 1·00 |
| | 100·12 | 100·09 | 100·30 | 100·41 | 100·44 | 100·00 |

Where intense heat is employed, the absence of oxide of iron, lime, magnesia, and the alkalies should be ensured, as the more nearly we can approach a pure $Al_2O_3 \cdot 3\ Si\ O_2$ the more infusible will the clay be. It may be urged that the more highly silicated a brick is the higher the temperature it will stand without fluxing. This may be so theoretically, but in practice it is next to impossible to obtain silica suitable for brickmaking free from its profligate associates. I hold that much more should be done in the way of the complete analysis of brick materials than is done at present, as it can hardly be satisfactory to find out the unsuitability of a certain description of fire-ware by the process of stopping the plant, and taking it out to replace it with fresh.

Red bricks, or common bricks, do not require special mention as they are not, and never should be employed in the presence of strong chemicals; but the Staffordshire blue brick is very largely employed for acid work, notably in the packing of denitrating columns, and the results of the analysis in Table IV. are from a sample of blue Staffordshire brick of the best kind I have ever met with for the purpose.

For the construction of pyrites burners, spent-oxide kilns, and all other kinds of work where similar acid gases are present, many prefer to use the blue Welsh bricks, and I prefer this kind myself for such work. In the construction of a new works the bricks for building may often be made very cheaply on the spot. In making up an ordinary open kiln for burning it should be as large as possible, even to containing 90,000 bricks, so as to economise fuel. The cost of brick making by this means is trifling, the labour of making and burning can be done by contract for eight shillings per 1,000, about 8 cwt. of coal being consumed for every 1,000 bricks in such a kiln. Closed kilns of the ordinary type are more expensive in use; four ovens holding 17,000 each will turn out 30,000 bricks per week taken from a semi-dry machine, and, unless special arrangements are employed to economise fuel, will consume 15 cwt. of coal per 1,000 bricks burned. Such a kiln costs fifteen-pence per 1,000 to empty besides the labour of making and filling.

The properties of the principal descriptions of bricks may be found in the next table:—

**Table V.**

| Description. | Specific gravity. | Crushing weight in tons per square inch. |
|---|---|---|
| London stock | 1·86 | 0·26 |
| Common red | 1·88 | 0·36 |
| Stourbridge | 2·22 | 0·78 |
| Welsh blue | 2·40 | 0·82 |
| Staffordshire blue | 2·46 | 0·86 |

For rough purposes a good solid brick may be taken as weighing nine pounds.

Number of bricks in a cubic yard of brickwork ... 384
" " rod " ... 4,400
" " " (dry) " ... 5,300

Ordinary firebricks are not generally suitable for packing acid towers, as I have known of several instances where they have been used and practically dissolved away by the action of the acid in less than six months. On the other hand, some varieties of silica bricks are unsuitable also, as they swell up under the action of acid, and force out and rupture the leadwork which they may have been intended to protect.

Clay pipes, or, as they are generally called, stoneware pipes, are very largely used in chemical operations for the conveyance of liquids and gases, and they have to be very carefully selected in order that they may answer their intended purposes satisfactorily. Generally salt-glazed ware is used, but some manufacturers supply a porous pipe suitable for boiling in gas-tar, which on penetrating into the very heart of the material forms a very useful cement and anti-corrosive element.

**Glass** is the acme of perfection of materials for the construction of chemical plant, and I have often wondered why some enterprising individual has not taken up the matter in earnest. It would certainly repay anyone to endeavour even to work out the subject; as to the users of apparatus it would be a great boon to be able to see what was going on inside.

The composition of glass of various kinds may be seen in the following table:—

**Table VI.**

| | Sheet glass. | English plate. | Belgian plate. | Carboy glass. |
|---|---|---|---|---|
| Silica ..... | 71·80 | 70·4 | 72·0 | 70·6 |
| Alumina..... | 1·20 | 1·1 | 0·8 | 3·6 |
| Oxide of iron. | 1·10 | 0·3 | 0·4 | 1·0 |
| Lime ..... | 13·80 | 15·9 | 14·7 | 13·0 |
| Soda ..... | 12·00 | 12·4 | 12·2 | 11·0 |
| | 99·90 | 100·1 | 100·1 | 99·2 |
| Specific gravity | 2·52 | 2·53 | 2·53 | 2·52 |

Most glass stands the action of acids, alkalis, and neutral liquids very well indeed, and it is quite astonishing what variations of temperature it will endure. For some years now glass pipes have been employed for taking the gases from saltcake furnaces to the condensing towers, and these gases will enter the pipe range at 800° F., and at some part of their travel are exposed to rain showers, which they endure admirably. They are thinner, moreover, than stoneware pipes, and cool the gases much more quickly. Mr. Douglas Herman has patented a new method of making these pipes, whereby they may be built up into condensing towers and made to replace entirely the ordinary Wolff bottle. This form will be more particularly described in a subsequent lecture.

Glass has been, and I believe is still, used for pump barrels for special purposes; it can be turned easily in the lathe, using turpentine as the lubricant and a rough file for the turning tool. The following physical tests have been made upon various kinds of glass:—

**Table VII.**

| | Specific gravity. | Tensile strength, lbs. per sq. inch. | Crushing weight, tons per sq. inch. |
|---|---|---|---|
| Sheet glass ..... | 2·52 | 2,680 | 14 |
| British plate..... | 2·53 | 2,560 | 14 |
| Carboy glass ..... | 2·52 | 2,613 | 15 |

**Mortars and Cements** should also be well studied in the construction of chemical apparatus, and I may venture to hint that in setting brickwork mortar is far too freely used, and is mostly placed by the bricksetter were it can be seen. Even in a good mortar the resistance to crushing is but small, so that the joint should be as thin as possible consistent with adhesion to the roughened surfaces of the bricks. Where no mortar-mill is at hand, a mixture of 1 part of lime to 2½ parts of sharp sand will yield a mortar so hard that after a few months a nail can scarcely be driven into it. Where a mortar mill is available, 1 part of lime ground up with 2 or 3 parts of well-burned ashes from the boiler or furnace fires makes an exceedingly good mortar, quite equal in tenacity and power of resisting compression to that made from lime and sand. Roman cement is obtained by calcining a limestone containing a large percentage of argillaceous materials, from 20 to 30 per centum; it is not much used, and can only be considered as a weak variety of Portland cement.

Portland cement is an artificial product, obtained by grinding chalk or limestone with a certain percentage of river mud or field clay. The mixture is ground together in what are called drag mills, and when fine enough the mixture called slurry is run out into backs to settle, the clear water is run off, and the mixture dried and calcined. After calcination the cement is ground finely and most carefully sieved. The specific gravity of well made cement varies from 1·6 to 1·7, and possesses the following chemical composition:—

**Table VIII.**

| | Slow setting. | Medium setting. | Quick setting. |
|---|---|---|---|
| Specific gravity ..... | 1·608 | 1·664 | 1·688 |
| Silica ..... | 20·80 | 19·90 | 21·30 |
| Oxide of iron ..... | 4·22 | 7·44 | 5·10 |
| Alumina ..... | 7·90 | 12·16 | 9·70 |
| Lime ..... | 63·56 | 55·88 | 59·06 |
| Magnesia ..... | 2·70 | 0.67 | 0·72 |
| Potash ..... | 0·04 | 1·10 | 1·22 |
| Carbonic acid ..... | 1·14 | 2·20 | 1·32 |
| | 100·36 | 99·35 | 98·42 |

Portland cement is an exceedingly useful substance where neutral or alkaline liquors have to be dealt with, and although it has been stated that it will resist acid, this certainly is not the case. If it were so, cement of this kind would be a most valuable material. Cement finds its best use for the manufacture of concrete for floors, for the formation of beds for engines and other machinery, and for the construction of tanks for the storage of alkaline, neutral, or oily liquids.

For the manufacture of concrete, 1 part of cement should be well mixed with 7 parts of broken stone, broken bricks, burnt shale, shingle, gravel, or slag, and in forming walls or sides of tanks the mixture (well wetted, of course) should be rammed between planks reared edgeways to form the mould. When the walls have set, the surfaces should be finished by "skimming" with not less than a quarter of an inch in thickness of pure cement. A slow setting cement is the best to use for all ordinary chemical work, and in the case of tanks for holding an alkaline liquor, such as soap lyes for instance, the fluid should not be introduced until the skimming has thoroughly set hard, which in most instances will require about a fortnight. Well set Portland cement possesses a fair tensile strength, and also resists a considerable crushing strain, as the following physical tests will show:—

**Table IX.**

| Quality. | Sp. gr. | Tensile strength in lbs. per sq. yard. | Crushing weight in tons per sq. inch. |
|---|---|---|---|
| Slow Setting ..... | 1·608 ..... | 600 ..... | 2·23 |
| Medium " ..... | 1·664 ..... | 500 ..... | 1·82 |
| Quick " ..... | 1·688 ..... | 400 ..... | 1·56 |

Portland cement, and concrete made from it, does not attain to its full strength until some months after it has been made. Concrete, after having been made three months, is only two-thirds the strength which it should attain to at the end of nine months, so that this circumstance should be taken into account in designing deep tanks where the horizontal thrust is considerable, and in concrete roofs and floors, as more than one accident has happened through taking away the supports too soon.

There are many other cements occasionally employed in the construction and manipulation of chemical apparatus, such as the mixture of ground asbestos and silicate of soda for luting nitric acid and hydrochloric acid jars; silicate of soda and fireclay, used for purposes where there is a moderate amount of heat, such as caulking the valves of gas producers and the like; black putty for caulking the joints of muriatic acid gas pipes, which is made by working up well-dried China clay and barytes into a kind of putty with gas-tar and linseed oil. In some cases the linseed oil is omitted and a non-drying oil used in its place, or the oil is even left out altogether.

For the jointing of glass pipes an indiarubber cement, as described and used by Mr. Peter Hart, is now mostly employed; it does not set so hard as the black putty, and being more expensive it is used with greater care. It is made thus:—12 parts of raw linseed oil are made hot; in this are dissolved 12 parts of pure, genuine indiarubber. When dissolved, make into a stiff putty with powdered asbestos, working in the last portions by hand,

This is done by spreading the asbestos on a table and taking a lump of the mixture and kneading the asbestos into it.

Other cements that may be used for special purposes will be described amongst the various processes in which they are employed.

*(To be continued.)*

## THE PUMPHERSTON OIL COMPANY LIMITED.

THE report by the directors of this company for the financial year ending 30th April, 1888, states:—After providing for the maintenance of the works and mines during the year at a cost of £6,793 there is a balance at the credit of profit and loss account of £14,235, which is subject to the following deductions, viz.:—Interest on debentures and loans, £2,659; debit balance brought forward from last year, £1,160; leaving a credit balance of £10,415, which the directors recommend should be disposed of as follows, viz.: In writing off for depreciation of works, etc., £6,000; in payment of a dividend on the ordinary shares at the rate of 3 per cent. per annum, free of income tax, £3,187; leaving a balance of £1,228 to be carried to current year. The amount expended on capital account during the year is as follows, viz.:—Mining department, £2,083; crude oil and ammonia department, including patent rights and spirit recovery plant, £8,958; oil refinery department, £2,192; sundry departments, £35; total, £13,270. This expenditure includes the erection of a bench of eighty Young and Beilby patent retorts, with the patent rights connected therewith, the necessary extension of the sulphate of ammonia department to deal with the produce from this additional bench of retorts, further mining development to produce the shale required for these extra retorts, the erection of spirit recovery plant, and plant connected with the adoption of improved methods of oil refining. The expenditure exceeds what was contemplated by the directors twelve months ago, but the advantages to be derived will, they believe, amply justify it. The capital expenditure during the year now entered upon, so far as can presently be seen, will be chiefly confined to the erection of additional workmen's houses and the opening up of the new shale mine. The contract entered into with the Holmes Oil Company Limited in November, 1884, for the purchase of the total production of crude oil from their two benches of retorts for three years expired on 30th November last. This restricted the business of the company very considerably, and to partly meet the restriction the directors decided to erect one bench of retorts, and to develop the mines sufficiently to produce the additional output of shale required. In view of the agreements which have been entered into, by which it may become necessary to restrict the production of crude oil, the directors do not at present purpose erecting the further bench of retorts which would be required to balance the curtailment of the through-put consequent on the expiry of the contract with the Holmes company. The directors are pleased to be able to say that during the year under review a strong and earnest effort has been made by all the oil companies to act unitedly on the questions affecting the industry, including the regulation of production to suit consumption, and the reduction to a minimum of the evils resulting from over competition in the sale of certain products; and that after many prolonged meetings and conferences among the representatives of the different oil companies the numerous difficulties which naturally presented themselves in successfully dealing with the complicated interests involved were ultimately overcome. The meetings of representatives of the various companies have been beneficial in many ways, and have resulted in the execution of two important agreements—one for the regulation of the production and selling of solid paraffin, and one fixing the selling price of burning oils. The solid paraffin agreement, the parties to which are the scale producers of this country and America, fixes and deals with the proper relative difference in value of scale, wax, and candles, and it is to last for one year. The burning oil agreement was entered into by all the Scotch oil refining companies to fix uniform prices for Scotland. These agreements have undoubtedly been productive of good in prevent ing unnecessary competition, and it is confidently hoped that they will not only be beneficial to the trade during the current year, but will lead to similar arrangements in the future. The downward movement in the value of shale products which has continued for some years past has now been arrested, and an upward movement has undoubtedly taken place. The year just closed has not derived any material benefit from the improvement, but should the advance in prices be maintained (and there is every reason to hope that this will be so), the present year will derive substantial advantage from the enhanced value of shale products. The shale supply continues ample. Hitherto the mining operations of the company have been confined to the working of two seams of shale, but a third seam, which is won by the present mines, is now being opened out, and is yielding results equal to those obtained from the two seams presently being worked. The new mine, which is now in course of development, wins other two seams of shale of fair thickness and of good quality, which, when opened out, will give the company command of five different seams, and allow of a large output from existing mines for a practically unlimited period. The mines have been maintained out of revenue at a cost of £1,636. 2s. 7d. Works—The works have been maintained in the highest state of efficiency at a cost of £5,157. 3s., charged against revenue. The retorting plant is in good condition, and is distilling at the rate of 200,000 tons of shale per annum. The directors have decided that it will be advantageous to the company that an additional member should be added to the Board, and they have invited (subject to the confirmation of the shareholders at the general meeting) Mr. Thomson M'Lintock, C.A., Glasgow, a gentleman of known ability and good business capacity and experience, to join the Board, and, Mr. M'Lintock having expressed his willingness to act if appointed, the shareholders will be asked at the general meeting to endorse the action of the directors. The directors who retire at this time are Messrs. Tennent and Craig, who are eligible for re-election, and who are willing to act if re-elected. The appointment of an auditor will fall to be made at the meeting. The directors recommend the appointment of Mr. Thomas Landells Selkirk, C.A., Glasgow.

# Legal.

## PROSECUTIONS FOR SELLING ADULTERATED LARD.

AT the Stipendiary's Court, at Fenton, last week, Henry Gerrard, of Normacot, and Thomas Hawley, of Dresden, grocers and provision dealers, were summoned by Mr. E. W. H. Knight, inspector under the Adulteration of Food and Drugs Act, for selling lard which was not of the nature, substance, and quality demanded. In Gerrard's case the county analyst's certificate showed that the lard was adulterated to the extent of 2·54 per cent. with water; while in Hawley's case the article contained 2·3 per cent. of water. Both defendants said they sold the lard in the state in which they received it from the refiners, and Gerrard stated that his was the "Stag's Head" brand, and that each tin of lard bore an analyst's certificate, to the effect that it was free from moisture, and quite pure. The Stipendiary said retail dealers could always protect themselves by obtaining a written warranty from the refiner or wholesale dealer, or by informing the purchaser that they did not sell the article as pure. If they did not choose to take either of these courses, the magistrates must protect the customers from being supplied with adulterated goods. One of the defendants having remarked upon the small percentage of water in the lard, the Stipendiary said that 2 or 3 per cent. would produce a considerable profit where there was a large sale; and in reply to his Worship, Mr. Knight said that fully one-half of the samples he obtained were found to be entirely free from water. At one time nearly all were found to be pure, and the inspection was then relaxed a little, with the result that they had begun to use water again. The defendants were each fined 10s., and 18s. costs.—John Siddall, grocer and provision dealer, Dresden, was charged with a similar offence, and in this case the county analyst (Mr. Jones, of Wolverhampton) gave evidence to the effect that he found the lard to contain 15 per cent. of cottonseed oil. This was a drying oil, and would soon turn rancid, and it was only about half the price of lard. In reply to Mr. F. Smith (Liverpool), who appeared for the defence, he said he did not suppose for a moment that the adulterant had been added by the dealers. Mr. Smith said this lard was imported largely from America, and as he understood from the inspector that this was the first of his cases in which this adulterant had been found, it was highly important that the matter should be fully tested. He therefore suggested that the third

sample into which the inspector's purchase was divided should be sent to the chemical laboratory at Somerset House for analysis. Mr. Knight said if Mr. Smith disputed the accuracy of Mr. Jones's analysis, he should have had his client's sample analysed. Mr. Smith said there had not been time to do that since the summons was issued; but the matter was so important that the opinion of an independent analyst would certainly be obtained. The Stipendiary thought the defendant was entitled to have the lard submitted to a Government analyst, and granted an adjournment for this course to be adopted.

BAKER V. HEDGECOCK.

THIS was one of a numerous and growing class of cases, and involved a question of construction of some importance. The plaintiff was a tailor in Holborn, and the defendant had recently been in his employ as foreman cutter. The defendant, when he entered the plaintiff's employ, executed an agreement, one of the terms of which was that he should not, after quitting the plaintiff's service, enter into any engagement or business whatever within a distance of one mile from the plaintiff's premises in Holborn. The plaintiff now moved to restrain the defendant from carrying on the business of a tailor within the prescribed distance.

Mr. Stokes appeared for the plaintiff, and Mr. Vernon R. Smith for the defendant.

Mr. Justice Chitty said that, notwithstanding the arguments to the contrary, he must hold that the agreement was nugatory. The authorities as to a general restraint on trade being bad were unquestionable. It had been argued that the agreement was a covenant not to carry on within a given radius the business of a tailor or any other business, and that the Court would enforce the covenant so far as it was reasonable—that was to say, so far as it was particular, and "Baines *v.* Geary" ("L.R." 35, Ch. D., 154) was relied upon in support of such an argument. For his part he was of opinion that in "Baines *v.* Greary" the covenant was in fact divisible into two parts, but a covenant like that before him could not be carved up to suit one party. To construe the covenant in the way contended for by the plaintiff would be to create, and not explain, a covenant.

The motion was dismissed with costs.

## THE PARR ALKALI WORKS.

RE LOCKWOOD AND LEITH.

IN this matter an adjourned motion by Colonel Gamble, of St. Helens, one of the creditors, came on for hearing on Friday, the 8th inst., before his Honour, Judge Collier, in which the respondents were Mr. Geo. Nicholson and the committee of inspection. The object of the motion was to restrain the trustee from carrying out the directions of the committee of inspection to sell the estate of the bankrupts to the firm of Messrs. Knight, Hill, and Co., of London, or to any other person, on terms less favourable to the estate than have been offered by Col. Gamble. After argument, his Honour, in giving judgment, said:—Whether or not the case cited of *ex parte* Gidebottom be an authority I have not had an opportunity of looking at the case, so I don't wish to give a very decided opinion on that point. I am of opinion that Col. Gamble, who brings this motion, has not any grievance under the section of the Act which governs it. I think if a grievance has been done it is perfectly clear that the trustee under the bankruptcy has a discretion, and ought to have a discretion, as to the sale of the bankrupts' property, and that the court should not interfere to restrain him unless it were shown there was some absurdity or some misconduct, or something that was perfectly obviously against the sale being in the interests of the general body of creditors. But in this case it seems to me there is nothing of the kind. Supposing there were an actual contract for sale, I do not think that the trustee ought to be interfered with, even if he chose to take as the purchase money a sum sufficient to pay 6s. 8d. in the pound instead of 7s. 6d. It is for him to judge under all the conditions if it is the best for the general body of creditors. He has the power under the Act of Partiament to sell, and, as I said before, unless some very gross misconduct or absurdity were shown, the court would not interfere with the sale. With respect to what has been said with regard to the committee of inspection, it seems to me that interference with the power to sell is not intended under the true construction of the Act of Parliament to be interfered with by the committee. The duties of the committee of inspection, under section 57 of the Act, it appears to me are more relative to the carrying out of the business of the bankruptcy generally than relating to the sale of the whole of the bankrupts' estate. Then I think there has been no act on the part of the trustee in this case which could be interfered with, supposing the court thought it had the right or had the power to interfere under what has happened. Here the trustee does not say he is going to accept this offer, but, under the circumstances, he thinks he had better get the direction of the court. He came to the court, and the court refused to interfere. There seems to me to be no act on his part on which the court could interfere, and certainly none on which it ought to interfere; therefore I dismiss this motion, with costs.—Motion dismissed accordingly.

## THE EGLINTON CHEMICAL CO. AT THE GLASGOW EXHIBITION.

THE Eglinton Chemical Company Limited have on show at the Glasgow International Exhibition a number of novel forms of bricks in a neat show-case. The silica bricks shown are made from pure flint found embedded in limestone in their quarries in Ireland. These bricks are now largely used where the Welsh bricks were used before, and are sent in considerable quantities to the North of England, Italy, Sweden, and other places abroad. A brick made from a rich chrome iron ore, and a bauxite brick, made from Irish bauxite obtained from the mines in County Antrim, both patented by Mr. Donald, manager of the company, are also shown, the former being suitable for resisting greater heats than the silica brick, and the latter being intended for blocks of steel furnaces, and any other uses where the bricks are exposed to the possibility of contact with metals. These bricks were first shown at the Mining Exhibition, and have since been shown at the Edinburgh Exhibition, medals of merit having been gained on both occasions.

# Correspondence.

*ANSWERS TO CORRESPONDENTS.*

STANNUM.—There is a process working for extracting the tin from tin-plate cuttings, waste tinned iron goods, etc., but our columns are not intended to teach the details of such a business.

PAUL PRY.—You are quite mistaken. You should be delighted to be treated to a peep into the enemy's camp.

H.H.C.—None whatever.

DISTILLER.—We believe the process is a success, and is in use in several works. In reply to your other query—yes, carbonate of potash.

D.R.C.—We have not heard of the machine you mention, but if you send us particulars we will inquire about it.

C.C.H.—The first four chapters constitute the first lecture.

R.C.B.—Suitable only for our advertising columns.

D.B.—Thanks for your suggestion; we will endeavour to see whether it can be carried out.

ANALYST.—The examination of the alloys you mention can only be carried out by an expert analyst, and we would advise you not to attempt it yourself under the conditions named.

PATENT.—The law gives you a "patent," but not a valid patent. In the case of a dispute the validity would have to be settled in a court of law.

J.H.D.—Unless you are an expert in such matters do not attempt it yourself. Employ a patent agent; their fees are not unreasonable.

## THE WEST LOTHIAN OIL COMPANY LIMITED.

THE report by the directors of the West Lothian Oil Company Limited has been issued. It is as follows:—The directors beg to submit their annual report, and an abstract balance-sheet of the affairs of the company for the year ending 31st March, 1888. The balance to the credit of profit and loss account is £319. 10s. 5d., after charging £655. 16s. 11d. for interest on loans and debentures, £2,997. 16s. 8d. for repairs and maintenance, and £557. 6s. 3d. for capital depreciation. The capital expenditure includes the cost of the erection of an additional bench of sixty-four Young and Beilby retorts, with the patent rights in connection therewith; spirit recovery plant; extension of paraffin scale plant; ice machine; a new cooling machine; and other plant necessary for carrying on the work efficiently. The works are now completely furnished with appliances for giving refined products of the best quality. During the past four months all expenditure has been charged against

revenue, and the directors hope to require little or no further capital outlay. The erection of the new bench of retorts enables the work to be carried on at a smaller percentage of cost, as the refinery now receives a full supply of oil, and can be worked to its full capacity, instead of partially as hitherto. The prices of shale products during the year under review have been lower on an average than in any former year. There was, however, much irregularity in prices; and your directors regret that large contracts were entered into when rates were lowest, and the company, in consequence, derived little benefit from the better prices which were current during the latter part of the year. This improvement in prices has been in part maintained, and, at current rates, the business of the company can be conducted with a prospect of a fair return to the shareholders in the future. The directors regret that, for the past year, there can be no dividend. Mr. Henry Walker, Mr. Gideon Brown, and Mr. J. D. Walker have resigned their seats at the Board, Mr. Hugh Mair, Mr. Robert Cameron, and Mr. John Menzies Robertson have joined the board of directors. The director retiring at this time is Mr. John Menzies Robertson, who being eligible, offers himself for re-election. The auditors, Messrs. Brown, jun., Davies and Tait, C.A., Glasgow, retire, but are eligible for re-election.

## CRITICAL POSITION OF THE COPPER SYNDICATE.

IT is apparent that the French Copper Syndicate are now convinced that they cannot carry their speculation in copper to a successful issue, on account of the greatly increased supply and diminished demand which, week by week, and month by month, renders their position less tenable. It is announced from Paris that it is sought to form an allied syndicate to furnish funds, in addition to those already advanced or guaranteed by the Société des Metaux, the Comptoir d'Escompte, and by Monsieur Sécrétan personally. But the generally wide-awake Frenchman must have sadly deteriorated if he is deceived by so transparent a *ruse* as this, as even a half-witted person would at once discern that if the operation is capable of a profitable conclusion, the wealth at the back of this powerful syndicate is ample for the purpose.

From the "Statistics of Copper," published by Messrs. Henry R. Merton and Co., on 31st ult., it will be noticed that the rapid accumulation of stock on hand and afloat continues, as it has increased from 42,302 tons on 31st December last, to 69,487 tons on the 31st ult.

From the following statement of the receipts and deliveries for the last six months, the present position of the Copper question will perhaps be more readily grasped than by any other method:—

| | Deliveries. | Receipts. |
|---|---|---|
| Month ending Dec. 31, 1887 ... | 12,087 ..... | 9,267 |
| " " Jan. 31, 1888 ... | 5,928 ..... | 9,119 |
| " " Feb. 29, " ... | 4,616 ..... | 11,717 |
| " " Mar. 31, " ... | 4,489 ..... | 10,643 |
| " " Apl. 30, " ... | 5,877 ..... | 11,479 |
| " " May 31, " ... | 6,044 ..... | 11,182 |
| | 39,039 | 63,407 |
| Less amount of deliveries..... | | 39,039 |
| Excess of receipts over deliveries for six months ending 31st may, 1888..... | | 24,368 |

If we take it that the contracts of the Syndicate with the Copper Companies have about three years to run from December last, and that the excess of receipts over deliveries continues at the same ratio, this excess will then amount to 146,208 tons. If the quantity purchased by the company in order to advance the price from £40 to £80 per ton was only 25,000 tons, the stock unsold in their hands on the 31st December, 1890, will amount to 171,208 tons. It is possible that the deliveries may somewhat increase, even if the high price should continue, but these would be more than counterbalanced by the product from new sources of supply over which the company has now no control.

With these figures before us, it seems possible to make some rough calculation as to the profit or loss which may be realised by the syndicate during the term of its contract with the copper producing companies. To give the syndicate the benefit of every advantage, we will suppose that every ton of copper delivered during the last six months, 39,039 tons, has passed through their hands, and that they have realised an average profit of £10 per ton: this would give them a profit of £390,390 for the six months, or £2,342,340 for the three years over which their contracts run. On the contra side of the account we find, from the above statement, that they will then have accumulated a stock of 171,208 tons purchased at from £65 to £70 per ton. But taking only the lower figure as the basis of our calculation, we find that this surplus stock of 171,208 tons will have cost the company the sum of £11,128,520, of which amount a large proportion will have remained idle, and therefore unremunerative for a long period of time.

If the company should not throw up the sponge till then, or if it should force goods on the market before that time, the price will revert to at least the rate current before the syndicate commenced operations, say £38 to £40, or perhaps the knowledge that this immense stock lies at the back of the then current deliveries, may necessitate even still lower figures.

But, granting that a price of £40 will be realised, the product of this 171,208 tons will only be £6,848,320, and the following, therefore, may be taken as the result of the operation:—

| | |
|---|---|
| Cost of 171,208 tons at £65 ..... | £11,128,520 |
| Interest on outlay during three years... | 500,000 |
| Less..... | 11,628,520 |
| Profit on all deliveries during three years at £10 per ton profit ..... | 2,342,340 |
| | 9,286,180 |
| Value of 171,208 tons on hand 31st December, 1890, at £40 ..... | 6,848,320 |
| Probable net loss... | £2,437,860 |

We do not think that this prospect is sufficiently encouraging to induce the successful formation of a company to take over the responsibilities of the Société des Métaux and of the Comptoir d'Escompte. Nor is it likely that the copper companies, who now possess the guarantees of such wealthy corporations, will consent to exchange these guarantees for the less substantial one of a freshly-formed company.

However rash the proceeding, it may have been just permissible for the Société des Métaux to have entered into a speculation which its managers considered likely to prove a profitable one, but we cannot help expressing our opinion that the Comptoir d'Escompte has grossly over-stepped the margin of legitimate banking by assuming a responsibility so immense that the failure of the enterprise may seriously imperil the interests of their shareholders.

It will be well if the loss is a sharp and serious one, so that in the future grasping speculators may beware of seeking to enchain the free progress of commerce in any of its varied branches. Our remarks on the syndicate may not be quite valueless to the holders of copper shares, who will do well to carefully note that however good the dividends may be for the next two and a half years, they must then be prepared for a total closing of some sources of supply, and for small profits only from the remainder. Those who now sell out their holdings will then probably be able to buy them back on most advantageous terms. *Verb. sap.—Investors' Guardian.*

# Trade Notes.

Chemistry and Chemical Engineering.—This is what the prospectus of the Massachusetts Institute of Technology says:—It is not believed that it is feasible to train men who shall be at the same time chemists and engineers; hence this school offers two separate courses, a course in chemistry designed to train men for those places where the demands are for those capable of executing chemical work, and a course in chemical engineering, designed for those who are to deal with questions of engineering and construction, where a knowledge of the principles of chemistry, and the method of applying these principles, is necessary.—1888.

Discovery of a Silver Mine in South Wales.—It is stated that in sinking a well on a farm at Llangadock, Carmarthenshire, the tenant has unexpectedly struck upon a valuable silver mine. Samples have been taken for analysing, and it is hoped that some arrangement will be made with the Crown as to royalties, in order that the development of operations shall not be hindered. The silver was discovered at a depth of about 20 feet in rock.

A GLASS CANDLE.—Mr. W. D. Herman, of West Park, St. Helens, has brought out a new candle-holder. The principle is that of a carriage lamp, the candle as it is consumed at one end being continually pressed upwards by a spiral spring of thin steel wire at the other. The chief feature of novelty in the invention is the substitution of a tube of glass for the metallic tube of carriage lamps, and of ordinary candle-lamps. By the employment of glass some important advantages are secured, as the tube may be painted any colour, silvered like a mirror, or decorated in various other ways, and it never tarnishes—a feature which will be fully appreciated by careful housewives residing in towns like St. Helens, at least until the good time coming when sulphur and "chemic" shall be no more.

INVENTION IN THE TANNING TRADE.—An invention has been made which is likely not only to revolutionise the tanning trade, but also to prove an immense boon from a sanitary point of view. It consists of using carbonic acid gas to swell the hides and get rid of lime and greases by chemical action. The gas is generated in the usual way from whiting and sulphuric acid, and is introduced into a pit where the hides and skins are in water. In the space of two hours or less the chemical action, which formerly took weeks and months, separates and deposits the lime and extracts the grease. The method is less injurious to health, considerably purifies the process, and renders the hides much fitter for the tanyard than by the existing method.

THE MERSEY SALT AND BRINE COMPANY LIMITED.—An extraordinary meeting of the above company was held on Monday, the 4th instant, at the offices of the company, 22, Great Winchester-street, London, to confirm resolutions passed at a special general meeting of the shareholders, on the 8th ult. The proceedings were, therefore, purely formal, the Hon. Ashley Ponsonby in the chair. The resolutions submitted for confirmation were the following:—1. "That power be given to the directors to raise not exceeding £10,000, on the security of a further issue of debentures bearing interest at 10 per cent." 2. "That in the opinion of this meeting it is desirable that a strong effort should be made to preserve the valuable property of the company in the hands of the shareholders until the present depression in the trade has passed, and that the directors be requested to recommend the debenture and shareholders to make a *pro rata* subscription of such percentage of their present holdings, not exceeding £10,000, as is required for present purposes." Both resolutions were confirmed without discussion—the former on the motion of the chairman, seconded by Mr. Blake, and the latter on the motion of the chairman, seconded by Mr. Finlayson.—The chairman afterwards observed that the company was a good concern, and it could be made a thorough success when salt resumed its proper value, if the shareholders had faith and if the directors and shareholders put their shoulders to the wheel.

DETECTING GAS LEAKAGE.—Dr. Bunte's method for detecting gas leakage by means of palladium paper has been rendered still more delicate by Herr Schaufflers, who uses, to every 3 parts of chloride of palladium, 1 part of gold. The increase of sensitiveness may be partly due to catalytic action, that is, to the mere presence of the gold, perhaps to the action of traces of acetylene upon the gold solution. The solution used for making the paper contains $\frac{3}{8}$ per cent. of chloride of palladium, and $\frac{1}{8}$ per cent. of chloride of gold. Half a litre costs about nine shillings, and will steep filter paper enough for 8,000 to 11,000 tests.

DANCING AT THE EXHIBITION.—It is quite evident that all the visitors to the Glasgow Exhibition do not go for mental improvement, as the following letter to the *Glasgow Herald* will show:—Sir,—Kindly allow me through your valuable paper to draw attention, on behalf of a great many young ladies and gentlemen, to something wanting at the Exhibition. The want is an opportunity to have a dance in the open air on two or three evenings weekly. Under the management of any of our principal M.C.'s dancing would be properly conducted, and a great deal of the band music put to an invigorating and healthful use. The executive could arrange details, such as platforms, extra charges, etc. I merely throw out the hint that such a thing as a dance is earnestly wished for by a large number, and some other correspondent may put the matter into a favourable and more detailed shape.—And this from sober-minded Scotland too.

ENGLISH TOBACCO.—So far as the experience of the London Chamber of Commerce goes, the prospects of tobacco culture in this country do not seem of a very hopeful character. A committee appointed by the Chamber have just been examining samples of tobacco sent in to compete for the prize of £50 offered for the best commercial samples grown last year. The result of the experiment appears to be an opinion to the effect that home-grown tobacco is stalky and coarse; that is has an excess of moisture; that its burning quality is bad; and that there is an absence of flavour about it. These disadvantages considered, it seems scarcely necessary to weight the home culture of the weed with restrictions pertaining to revenue in order to make tobacco growing in England an unremunerative undertaking.

FIRE AT A CHEMICAL WORKS.—Late on Saturday, the 2nd inst., a fire occurred at the chemical works occupied by Mr. William West, at Derby. A building containing about sixty tons of charcoal and other property was destroyed. The cause of the fire is unknown.

A PREMIUM.—Messrs. Sturnm Brothers, of Neuenkirchen, have offered a prize of £500 for the best models and treatise, accompanied by drawings and descriptions, for obviating the inhalation by the workmen of the dust arising from the grinding mills operating on the Thomas Slag. The best will be placed in next year's Exhibition at Berlin for appliances for the prevention of accidents, when a jury selected for the purpose will award the prize.

RUSSIAN IMPORT DUTIES.—It is reported that Russia has raised the duties on refined sugar to 60s. per 100 kilogrammes, on raw sugar to 40s., on aniseed, canaryseed, and vinegar to 25s., on herrings to 10s., on spirits to 150s., on dried fruits to 30s., on oranges to 20s., on almonds to 40s., on saffron and vanilla to 600s., on cardamons to 200s., on cloves and pepper to 50s., and on cherry syrup to 45s. per 100 kilogrammes.

IMMENSE IMPORTATION OF EGGS.—For months the egg trade has been active at West Hartlepool. But in the past week 600 tons of eggs were landed there in four days. This represents probably more than 9,000,000 eggs — above 2,250,000 daily.

PEROXIDE OF HYDROGEN, according to Dr. Love, of St. Louis, is a most valuable agent in the treatment of diphtheria, ozæna, and in all cases of cancerous ulceration and of suppuration or necrosis. He employs it in a solution containing 0·5 to 3 per cent., using most frequently, however, a strength of one per cent., diluting the commercial "ten volume" peroxide with two or three times its volume of water. Of its value in clearing away and effectually deodorising the decomposing exudate in cases of diphtheria he speaks in the most emphatic terms, and he regards the remedy also as one of great usefulness in scarlet fever, whooping cough, and other specific diseases.

PAPER BOTTLES.—One of the most interesting of the many uses to which paper has been put is the manufacture of paper bottles. We have long had paper boxes, barrels, and car wheels, and more recently paper pails, washbasins, and other vessels; but now comes a further evolution of paper in the shape of paper bottles, which are already quite extensively used for containing such substances as ink, bluing, shoe-dressing, glue, etc., and they would seem to be equally well adapted for containing a large variety of articles. They are made by rolling glued sheets of paper into long cylinders, which are then cut into suitable lengths, tops and bottoms are fitted in, the inside coated with a waterproof compound, and all this done by machinery almost as quickly as one can count.

THE RIO TINTO MINES.—We meet with the following announcement in the Seville newspapers:—In the mines of Rio Tinto workmen may meet with immediate and remunerative employment. They should, however, be furnished with documentary evidence of their personality, and on presenting themselves at Huelva and stating that they are seeking work at the mines, the railway company will grant them special fares. This announcement is a great contrast to the fears which have been expressed, as to the evil consequences of the prohibition of the open-air calcinations.

THE NEW SUGAR CROP.—The following is extracted from the report of Messrs. Scott and Co., dated Port Louis, Mauritius, May 4:—"We have the promise of one of the best sugar crops experienced for some years, the weather since the opening of the year having been all that could be desired. Of the present crop there is in store about 30,000 tons. In our market, with the exception of steady purchases for Bombay, there has been little movement, the continued scarcity of suitable tonnage preventing operations for both the United Kingdom and the Colonies. In the circumstances extreme dulness prevails in these directions. Some business for the United Kingdom or America would doubtless have been done in syrups were ships available, but nothing suitable is at present open for charter.

## A GERMAN LABOUR REGISTRY OFFICE.

IN a report just laid before Parliament (miscellaneous series, No. 89), Mr. Greene, of the British Legation, Stuttgart, describes the working of an institution founded in Wurtemberg for the purpose of bringing employers and operatives together, and of enabling the latter to bring their labour promptly to the best market. It was founded by private enterprise in 1865, and has been a great practical success. It now numbers 1,000 members, and its income is derived wholly from subscriptions, fees for registration, and charges made for services rendered to employers using the office. Besides supplying masters with workmen, and the latter with employment, it supplies information of all sorts gratis with respect to several branches of labour, and provides assistance to journeymen in need of funds for the road. Subscribers of seven marks are entitled to the services of the society at any time, those of four marks to make thirty applications, three marks twenty, and two marks ten. Workmen pay about 2d. on application, which is returned if the introduction to employers with which he is then supplied are not successful, while if he obtains employment half of it is returned. The men prefer to make this payment, as it deprives the transaction of the character of a charity. Aid to workmen unable to find employment in one place to go to another, though administered by the society, is supplied from funds of the trade unions of the various handicrafts. Advertisements of vacant situations are inserted daily by the society in the various papers. The great bulk of the applicants for the society's aid consists of artisans and men engaged in special branches and handicrafts, rather than ordinary agricultural labourers, who do not average more than 10 per cent. of the total number. The work of the society for 1887 may be thus summarised—13,702 applications for and from workmen, and 567 cases of assistance to journeymen; 44,617 inquiries from workmen respecting conditions of labour elsewhere, and 504 men sent outside the State. The total revenue was, roughly, £280, and the expenditure £270. The regulations of the society appended by Mr. Greene to his report are few in number and of the simplest character.

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

The Scotch bleachfields are rather busier, especially those of Fifeshire and the east, and the price of bleaching powder is meanwhile maintained at last quotation, but after all the demand is not brisk, and orders for quite fair quantities may be placed at lower figures. Production, however, is in its turn under the average, and that of course has a stiffening effect. Sulphate of ammonia, from similar market causes, has continued to hold its own pretty firmly all over the week; £11. 13s. 9d. is said to have been done, but the idea of the representative seller is £11. 15s., one or two being inclined to move a step higher even. Not much is passing, and forward business may be described as at a standstill. For the rest, the chemicals market generally has suffered a further fractional declension and little is doing. Soda crystals, however, being into the scarce season are higher. Two more of Scotch shale distilling concerns have declared results for the year. Young's Paraffin Co. (the largest and oldest of the lot) and the West Lothian Company, which is one of the smaller and newer affairs. In neither case is there anything to divide, and positive deficit has been escaped only by the skin of the teeth. Nevertheless, the prospects of the general industry are distinctly brighter if the companies continue to make common cause as at present. General prices current are:—Soda crystals, 42s. 6d. net Tyne; alum in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £41 net Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76°, £8. 5s., 70/72, £6 12s. 6d., 60/62°, £5. 15s., and cream, 60/62°, £5. 13s. 9d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks £4. 15s., and 1 cwt. casks £5. 5s. net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 20s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 4½d.; chlorate of potash, 5½d., less 5 % any port; sulphate of ammonia, £11. 15s. f.o.b. Leith; sulphate of copper, £20. 10s.; paraffin scale, hard, 2 7/16d., soft, 2d.; paraffin wax, 120° semi refined, 2 11/16d.; paraffin spirit, 4½d.; paraffin oil (burning) 5¾d. to 6d., and lubricating ditto 865°, £4. 15s. to £5; 885° £6 to £6. 10s.; and 890/95° £7. 10s. to £7. 15s. Greenock has received five cargoes of raw sugar within the week.

## THE LIVERPOOL MINERAL MARKET.

The firmness reported in our market last week has been maintained. Manganese steady, without alteration. Magnesite (containing 98 per cent. of carbonate of magnesia) continues steady at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand): Brisk at full prices; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk has continued in good demand, bringing full prices, especially best brands—90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) in good demand: Selected crystal lump scarce at £6. 5s.; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone: Prices are unaltered—ground, at £8; specially selected lump, finest quality, £11. 10s. China clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn). Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone in more request, especially for good qualities—£5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth, steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda, quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore firm, 50 per cent. being in demand. Antimony ore continues firm; £16 to £22 for fair quality. Antimony metal, unchanged. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine, quiet, 60s. to 80s. Strontia, steady; sulphate (celestine), 17s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; Italian and Bohemian, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 per cent. packed, £11. 2s. 6d.; 70 per cent. packed, £10; 60 per cent. packed, £8. 16s.; 50 per cent. unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. Spiegel, 20 per cent., £4. 12s. 6d. Silicon spiegel, 9 per cent., £8. Chrome pig, 10 per cent., £8. 10s. to £10. Bitumen: Finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

Chemicals have ruled steady, without material alteration in prices. Soda-ash 1d. up. Caustic soda: 60 % white, £5. 17s. 6d.; 60 % cream, £5. 15s.; 70 % white, £6. 17s. 6d.; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda, 9s. 6d. to 9s. 9d. Soda crystals, £2. 15s. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 12s. 6d. for hardwood, and £7. 10s. for softwood. Saltcake, 22s. Bichromate of potash, 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £18 to £20. Chlorate of potash, 5½d. to 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of Baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. 10s., strong. Lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper quoted at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20. per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax unaltered. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Pearl ashes, £2. 3s.

## THE LIVERPOOL COLOUR MARKET.

Colours unaltered. Ochres: Oxfordshire is quoted £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s., to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per pound. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

Prices all round keep fairly steady, and there are in some quarters certain slight evidences of improvement in trade. Alkali is well maintained in price, and some leading brands of Leblanc soda-ash still command 1$\frac{1}{32}$d. f.o.b. Caustic soda moves off freely and saltcake is firm. Bleaching powder has rather declined in value and chlorate of potash can now be bought for 5$\frac{1}{2}$d. per lb. Muriate of ammonia is more inquired for and price is firmer. Other ammonia salts are without change. Sulphate of copper keeps steady. Tin and zinc salts are in moderate request at current rates. Lead and litharge are slightly easier again. Lead salts are difficult to sell. Nitrate at £22. 10s., and acetate at £27 at makers' works. Foreign white acetate in quantity can be brought at £25 c.i.f. Acetates of lime have been moving more freely. Nitrate of soda is offering at 9s. Yellow prussiate of potash is slow of sale at 6$\frac{3}{8}$d. to 6$\frac{1}{2}$d. per lb. Acetic acids are still in excess of demand and prices are low. Potash carbonate and caustic remain steady.

## METAL MARKET REPORT.

Good returns from the Board of Trade for the month of May have given a slightly firmer tone to the markets generally, and the splendid growing weather has during the past fortnight improved the harvest prospects. The grave reports from Berlin respecting the critical state of the health of the German Emperor has had a depressing influence. There appears to be no doubt that the proposed new syndicate or company formed to strengthen the Copper Syndicate and to enable it to carry the rapidly accumulating stocks has been carried through. The report of the falling in of a portion of the Anaconda mine has been confirmed. Iron has had a steady upward tendency, at one time touching 38s. 1d. buyers, but closing easier at 37s. 11d. Tin is £1. 7s. 6d. lower for cash on the week, present price being £80. 10s. for cash, £81. 5s. three months. Copper: Scarcely any change, cash £82. 15s., three months, £79. The demand for copper and tin is very slack. Spelter and lead remain unchanged in price, but slightly easier. Silver is a $\frac{1}{16}$th better, 42$\frac{1}{16}$d.

## TAR PRODUCTS AND SULPHATE OF AMMONIA MARKETS.

There is no change in values in either of the above markets from our quotations of last week: 90's benzol is 2s. 4d., 50/90's 2s. 3d. per gallon; pitch 13s. f.o.b. Lancashire ports. Sulphate of ammonia ranges from £11. 12s. 6d. at Leith and Hull to £11. 17s. 6d. at Beckton.

# New Companies.

Anderson, Cox, & Company Limited.—This is an amalgamation and conversion to a company of the businesses of indiarubber manufacturers carried on by the firms of Messrs. Anderson, Anderson, and Anderson, of 23, Castle-street, Swansea, and Messrs. C. A. Cox and Co., of 34, Castle-street, Swansea. It was registered on the 4th inst., with a capital of £10,000 in £1 shares. The subscribers are:—

| | Shares |
|---|---|
| C. A. Cox, Swansea, indiarubber manufacturer | 1,000 |
| W. Morrish, Swansea, commercial traveller | 50 |
| W. W. Edward, Swansea, metal broker | 50 |
| J. F. Harvey, Swansea, chartered accountant | 50 |
| W. F. Richards, Swansea Valley, merchant | 50 |
| J. Lean, Swansea, accountant | 25 |
| T. O. Anderson, accountant | 50 |

Anglo-Indian Fibre Company Limited.—This company was registered on the 29th ult., with a capital of £25,000, in £1 shares, to purchase from the British Flax Producers Company Limited all the patents and inventions relating to the treatment of flax and other fibres, assigned to that company by Edward Johnson under an agreement of 14th January, 1887, and all the machinery, plant, and materials in connection with the working of the same. The subscribers are:—

| | Shares. |
|---|---|
| E. J. Hayford, 48, Osborne-terrace, Clapham-road, West African merchant | 1 |
| T. Janeway, Albert Embankment, stoneware manufacturer | 1 |
| F. Grant, 72, Bishopsgate-street Within, chartered accountant | 1 |
| G. Sharp, 14, Queen Victoria-street, retired shipowner | 1 |
| J. F. Stoy, 72, Lansdowne-road, W., merchant | 1 |
| A. H. Pratt, Ilford, Essex, clerk | 1 |
| G. T. Jellicoe, 136, Evering-road, merchant | 1 |

Dee Oil Company Limited.—Upon terms of an unregistered agreement with Wm. Clarke Deeley, this company proposes to purchase a business carried on under title of the Dee Oil Company, the locality of which is not stated in the registered documents. It was incorporated 31st ult., with a capital of £100,000, in £5 shares. The number of directors is not to be less than four nor more than six; the first are Lieut.-Gen. Sir John Stokes, Messrs. Thos. Makin, Wm. Clarke Deeley, Augustus Forget, and Mr. C. C. Hoyer Millar; qualification, 100 shares each. Mr. W. C. Deeley is appointed managing director for five years at a salary of £1,500 per annum, payable quarterly. The remuneration of the other members of the board is to be at the rate of £500 per annum for the chairman and £600 for division amongst the ordinary directors.

| | Shares. |
|---|---|
| J. T. Anford, 9, London-street, consulting engineer | 1 |
| W. E. Sibley, 33, Robinson-road, E., clerk | 1 |
| J. W. Skeet, 91, Gresham-street, clerk | 1 |
| S. J. Edwards, 368, Romford-road, Forest-gate, accountant | 1 |
| J. C. Bennett, 35, Charles-street, Hatton-garden, manufacturer | 1 |
| Lieut.-Col. A. M. Creagh, Bromley, Kent | 1 |
| H. W. Paul, 32, Craven-terrace, Hyde-park, shipbroker | 1 |

Edward Young and Company Limited.—This is the conversion to a company of the business of distillers and rectifiers, manufacturers of cordials, and wine and spirit merchants carried on by Edward Young and Company, at Seel-street, Tower-buildings and Tower-gardens, Liverpool. It was registered on the 31st ult., with a capital of £150,000, in £10 shares. The number of directors is not to be less than three nor more than five; qualification, 100 shares; the company, in general meeting, will determine remuneration. The first two subscribers are appointed managing directors, and will each be entitled to £500 per annum salary, and also to a commission of 2½ on the net profits of each year, provided such profits amount to 10 per cent. on the paid-up capital.

| | Shares. |
|---|---|
| Rowland Young, 11, Seel-street, Liverpool | 1 |
| J. J. Wood, 11, Seel-street, Liverpool, clerk | 1 |
| H. M. Geachin, 11, Seel-street, Liverpool, traveller | 1 |
| S. C. Woodward, 11, Seel-street, Liverpool, distiller | 1 |
| F. Richmond, 11, Seel-street, Liverpool, distiller | 1 |
| Reginald Young, Linnet-lane, Liverpool | 1 |
| P. S. Wood, 11, Seel-street, Liverpool, cashier | 1 |

D'Humy Cabinet Battery Syndicate Limited.—This company was registered on the 4th inst., with a capital of £15,000, in £250 shares, to acquire and work the invention patented by P. R. de F. d'Humy, for domestic electric lighting, called "The D'Humy Cabinet Battery. The subscribers are:—

| | Shares. |
|---|---|
| James Davidson, 8, The Avenue, Upper Norwod | 1 |
| W. W. Prole, Croyde, Devon | 1 |
| J. Johnson, 14, Manor-place, Paddington-green | 1 |
| F. D'Humy, C.E., 2, Carlton Mansions, Clapham-rise | 1 |
| J. T. Browne, C.E., 32, Rue Bandin, Paris | 1 |
| B. H. Hertslet, Belle Vue House, Richmond | 1 |
| F. B. Lidstone, 58, Warwick-road, South Kensington, land agent | 1 |

Instantaneous Steam Generator Company Limited.—This company was registered on the 4th inst., with a capital of £10,000, in £10 shares, to acquire and work the letters patent No. 9,047, of 1886, granted to John Blum, for the instantaneous generation of steam. The subscribers are:—

| | Shares. |
|---|---|
| J. B. Hamond, 28, Upper Park-road, Hampstead, mechanical engineer | 1 |
| J. Kemp Welch, Weybridge | 1 |
| J. Blum, 15, Upper Bedford-place, engineer | 1 |
| T. H. Harrison, M.E., Earlsfield-road, Wandsworth | 1 |
| G. Inskipp, 5, Bedford-row, architect | 1 |
| G. A. Gundle, 19, Great Winchester-street, electrical engineer | 1 |
| Sir Eustace F. Piers, Bart., Hulme, Manchester | 1 |

Star Sauce and Pickle Company Limited.—This company was registered on the 4th inst., with a capital of £10,000 in £1 shares, to trade as manufacturers of sauces, mustards, vinegars, pickles, proprietary articles, and patent medicines. The subscribers are:—

| | Shares. |
|---|---|
| William Okell, Heaton Norris, cabinet maker | 1 |
| Peter Okell, Stockport, cabinet maker | 1 |
| E. Bellamy, Heaton Norris, works manager | 1 |
| S. Washington, Harpurhey, Manchester, manufacturing chemist | 1 |
| E. Sykes, C.E., Cheadle, Manchester | 1 |
| R. Maunder, 714, Rochdale-road, Manchester, chemist | 1 |
| E. Dale, Bramhall, near Stockport, cashier | 1 |

Tirydail Tin-Plate Company Limited.—This company was registered on the 1st inst., with a capital of £20,000 in £100 shares, to acquire land at or near Duffryn, parish of Llandebie, Carmarthen, and to carry on business as tin-plate manufacturers, miners, smelters, chemical manufacturers, etc. The subscribers are:—

| | Shares. |
|---|---|
| David Jenkins, Swansea, merchant | 1 |
| G. Elias, Cwmmaman, Carmarthen tin-plate manufacturer | 1 |
| J. G. Noakes, Scranton, Penn., U.S.A. | 1 |
| W. N. Jones, Ammanford, auctioneer | 1 |
| J. Davies, Blaenhiraeth, Llanelly, farmer | 1 |
| W. Phillips, Ammanford | 1 |
| W. W. Brodie, Llanelly, solicitor | 1 |

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels :—*

APPLICATIONS FOR LETTERS PATENT.

**Purifying and Softening Water.**—(Complete Specification.) J. Langstaffe and H. D. Peckover. 8003. June 1.
**Hydrocarbon Engines.** A. S. Nelson. 8009. June 1.
**Manufacture of Antiseptic Substances from Waste Products.** W. Thomson. 8017. June 1.
**Mounting Thermometers.** C. T. Mitchell. 8027. June 1.
**Machinery for Amalgamating and Separating Gold and other Metals.** F. A. Purvis. 8030. June 1.
**Extinguishers for Oil Lamps.** A. C. Jones. 8035. June 1.
**Manufacture of Socket Pipes.** J. C. Johnson. 8037. June 1.
**Collection of Dust.** J. Higginbottom. 8038. June 1.
**Centrifugal Machines.** G. F. Redfern. 8052. June 1.
**Evaporating Pans.** G. Fletcher. 8053. June 1.
**Improvements in Dyeing.** E. Casper and J. Debnam. 8054 June 1.
**Air Pump.** L. Chiozza. 8058. June 1.
**Treating Vegetable Substances for the Production of Paper Stock.** (Complete Specification.) H. H. Lake. 8059. June 1.
**Caloric Engine.** C. Wells. 8066. June 1.
**Manufacture of Explosives.** J. Nicholas. 8072. June 4.
**Manufacture of Artificial Fuel.** J. Bowing and E. W. Beckingsdale. 8100. June 4.
**Manufacture of Maltose.** C. D. Abel. 8110. June 4.
**Removing Impurities from Maltose.** C. D. Abel, 8111. June 4.
**Removing Albuminous Matters from Maltose.** C. D. Abel. 8112. June 4.
**Drying and Curing Malt, etc.** E. Wilson. 8116. June 4.
**Centrifugal Pumps.**—(Complete Specification.) C. L. Hett. 8119. June 4.
**Indestructible Wick.** J. Davies. 8120. June 4.
**Evaporating, Distilling, or Condensing Apparatus.**—(Complete Specification.) T. Vyrazil. 8127. June 4.
**Utilisation of Slate and Waste Materials in the Manufacture of Glass.**—(Complete Specification.) W. J. Parry and J. T. Welch. 8129. June 4.
**Separating Solids from Fluids of Sewage.** G. Liscoe. 8130. June 4.
**Furnace Grates.** W. H. Heeson and G. F. Rogers. 8151. June 4.
**An Improved Motor.** E. A Y. Ostolaza. 8156. June 4.
**Treating the Ores of Copper and of other Metals for the Reduction of Metals therefrom.** W. G. Dickson and J. Clark. 8157. June 4.
**Production by Electricity of Chlorine and its Oxygenated Compounds.** E. M. H. Andreoli. 8160. June 4.
**Bleaching Paper Pulp by Electricity.**—(Complete Specification.) C. C. Nichols. 8161. June 4.
**Obtaining Silica and Clay or Alumina.** J. McCulloch, N. McCulloch, and J. Short. 8177. June 5.
**A Non-intoxicating Drink.** A. Walkyier and Dr. Lovel. 8195 June 5.
**A Saccharine Food for Cattle.** J. E. M. Vincent. 8198. June 5.
**A Self-acting Flushing Tank.** G. Withycombe. 8199. June 5.
**Manufacture of Carbonic Acid and Magnesia.**—(Complete Specification.) H. Leffmann. 8208. June 5.
**Artificial Leather.** N. F. E. Rapeaud. 8221. June 2.
**Machine for Eliminating Iron from Ores.**—(Complete Specification.) A. H. Reed. 8223. June 5.
**Dust Collectors.**—(Complete Specification.) R. L. Downton. 8226. June 5.
**Adhesive Mucilage.**—(Complete Specification.) E. Keirby. 8248. June 6.
**A Permanant Aniline Black in Cotton Yarns, etc.** W. E. Heys. 8250. June 6.
**Gas or Vapour Motors.** G. Johnston. 8252. June 6.
**Purifying Water Used for Wool Scouring.** E. Garside. 8261. June 6.
**New Preparations from Vaseline.** C. A. Morris. 8262. June 6.
**Improvements in Vessels Containing Liquids.** C. Wayte. 8275. June 6.
**Compositions for Antifriction Purposes.** J. T. Griffin. 8288. June 6.
**Apparatus for Separating Liquids having Different Boiling Points.** J. Y. Johnson. 8290. June 6.
**Treatment of Sewage.** A. G. Haddock and C. H. Harvey. 8291. June 6.
**Amalgamation of Gold and other Ores.** W. F. Donkin. 8303. June 6.
**Petroleum Motors.**—(Complete Specification.) A. Altmann. 8317. June 6.
**Construction of Furnaces and Flues for Steam Boilers.** R. Baird. 8318. June 7.
**Apparatus for Carburetting Gas or Air.** J. Love. 8325. June 7.
**Drying Tea Leaf.** H. Thompson. 8327. June 7.
**Extraction of Gold and Silver from Ores.** W. P. Thompson. 8332. June 7.
**Paint Destructor.** F. Lebacq. 8347. June 7.
**"The Fluid Saponaria" for Cleaning Paints.** F. Lebacq. 8348. June 7.
**Apparatus for Obtaining Anhydrous Liquid Ammonia.** G. S. Page. 8351. June 7.
**Manufacture of Wood Pulp.** C. Weisshuhn. 8364. June 7.
**Manufacture of Soap.** J. Jeyes. 8366. June 7.
**Compounds for Chemical Tanning.**—(Complete Specification.) E. Gerson. 8369. June 7.
**Prevention of Pollution in Rivers, and Recovery of Materials used in Paper Mills, Dyeworks, etc.** W. Edwards. 8371. June 7.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

W. S. Sutton, Lucy Maria Gillings, F. E. Sutton, Lydia Sutton, Mary Esther Sutton, Emily Satterthwaite, J. W. Sutton, and A. Sutton, Scotby, Wetheral, Cumberland, tanners and curriers, Leicester and Paris, under the style of W. Sutton; so far as regards Lucy Maria Gillings and F. E. Sutton.

Martin & Gibbins, Southsea, mineral water makers, pickle and sauce manufacturers.

Landon & Wilson, Aston and Birmington, patentees and manufacturers of concentrated chloroform water.

Wareing, W. D. Sansom, F. Leigh, and M. Buchanan, Okenshaw, under the style of the Hyndburn Printing Company, calico printers; so far as regards W. D. Sansom.

C. McDonald & Co., Eastwood, Nottinghamshire, oil and colourmen and aerated water manufacturers.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Sharp, Henry, London-place, London-fields, Hackney, bottle manufacturer.

Jeffrey, Andrew, Gloucester-road, South Kensington, London, sanitary engineer.

Holmes, John Henry, Colwyn, Carnarvonshire, and Colwyn Bay, Denbigshire, pharmaceutical chemist and druggist.

Hammond, Joseph, Wollaston, Stourbridge, and Tipton, glass manufacturer.

Packer, Henry James, Reading, oilman.

### Adjudications.

Sharp, Henry, London-place, London-fields, Hackney, bottle manufacturer.

Jeffrey, Andrew, Gloucester-road, South Kensington, London, sanitary engineer.

### First Meetings and Public Examinations.

Weeding, William Samuel, West Cowes, Isle of Wight, chemist. June 21, Chamber of Commerce, 145, Cheapside; July 4, Court-house, Newport, Isle of Wight.

### Notices of Dividends.

Millar, Richard, London-lane, Hackney, formerly of Lavender-grove, Dalston, Duncan-road, London-fields, and Derby-road, South Hackney, drysalter and sauce manufacturer. First and final dividend of 3s. 10½d., any day except Saturday, Chief Official Receiver's offices, 33, Carey-street, Lincoln's-inn.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending June 2nd.*

**Acetic Acid—**
Holland, 46 pkgs. Beresford & Co.

**Alum—**
Holland, 36 cks. Ross & Deering

**Alkali—**
Canada, 44 c. Charles & Fox
" 83 S. Ward & Co.

**Acetate of Lime—**
U. States, 273 bgs. Lister & Biggs

**Brimstone—**
France, 1 t. Christopherson & Co.
Italy, 3 Clift, Nicholson & Co.
" 400 W. C. Bacon & Co.
" 200 G. Ward & Sons
" 200 Ekman Pulp & Paper Co.

**Bones—**
Germany, 17 t. A. Rose & Co.
Salonica, 386 G. Bennett & Sons

**Barytes—**
Belgium, 21 cks. Prop. Brook's Wf
" 22 W. A. Ross & Co.
Holland, 44 W. Harrison & Co.
" 44 A. Bolz
" 69 Ross & Deering
Belgium, 110 O'Hara & Hoar
" 12 Leech & Co.
Holland, 11 R. Braithwaite
Germany, 23 Phillipps & Graves

**Barium Chloride—**
Germany, 15 cks. Petri Bros.

**Cream Tartar—**
France, 10 kgs. E.W. Carling & Co.
" 8 cks. Webb, Warter and Co.
Spain, 4 T. Merry & Son
Italy, 43 Howards & Sons
" 10 Fellows, Morton & Co.
France, 20 Webb, Warter & Co.
" 15 "
" 10 " [and Co.
Spain, 4 C. Christopherson

**Chemicals** *(otherwise undescribed)*
Canada, £48 M. D. Co.
Germany, 20 E. & W. I. D. Co.
" 536 A. & M. Zimmermann
" 10 E. & W. I. D. Co.
" 27 Phillipps & Graves
" 6 L. Lumley & Co.
" 39 A. & M. Zimmermann
Holland, 4 Ross & Deering
France, 8 Flageollet & Co.
Germany, 6 Craven & Co.

**Caustic Soda—**
Holland, 110 c. Beresford & Co.

**Caoutchouc—**
Zanzibar, 15 c. Major & Field
" 5 Brown&Elmslie
E. Indies, 70 N. S. S. Co.
" 42 Anderson, Weber & Smith
" 18 W. M. Smith and Sons

**Caoutchouc**—*continued.*
Madagascar, 130 c. J.H. & G. Scovell
Aden, 33 Kebbel, Son and Co.
U.S.Columbia, 22 L. & S. K. D. Co.
Aden, 20 Clarke & Smith
" 125 Elkan & Co.
E. Indies, 23 Beresford & Co.
Aden, 9 L. & S. K. D. Co.

**Caustic Potash—**
France, 30 cks. Weatherley, Mead and Co.

**Dextrine—**
Germany, 50 bgs. Prop Brook's Wf.
" 200 J. Barber & Co.

**Dyestuffs—**
**Extracts**
U. States, 435 bxs. Adamson and Ronaldson
France, 55 cks. L. J. Levinstein and Sons
U. States, 40 bxs. Williams, Terry & Co.

**Cutch**
E. Indies, 63 bgs. L. & S. K. D. Co.
" 63 Hale & Son
**Tanners' Bark**
Hobart, 4 t. L. & S. K. D. Co.
Germany, 35 Baxter & Hoare
" 58 Hicks, Nash & Co.
U. States, 3 W. E. Bott & Co.
Belgium, 6 Baxter & Hoare
**Safflower**
Spain, 1 cs. L. & S. K. D. Co.
**Saffron**
Spain, 1 cs. Pickford & Co.
" 1 C. Brumlen
**Turmeric**
E. Indies, 200 bgs. L. & S. K. D. Co.
" 201 Prop. Brook's Wf.
**Cochineal**
Germany, 6 bgs. Johnson, Rolls and Co.
" 25 J. Goddard & Co.
**Indigo**
E. Indies, 2 cs. Matheson & Co.
" 80 Arbuthnot, Latham and Co.
" 67 De Clermont and Donner
Germany, 2 cs. H. Lambert
**Anthracene**
Holland, 31 cks. Burt, Boulton & Co.
**Aniline**
Germany, 8 cs. Union Lighterage Co.
" 2 Forwood Bros. & Co.
**Myrabolams**
E. Indies, 683 bgs. Gray, Dawes and Co.
" 667 J. Graves
" 400 Humphery & Co.
" 3,559 Beresford & Co.
" 334 Marshall & French
**Orchella**
E. Indies, 70 bls. Lewis & Peat
**Argols**
Italy, 728 bgs. B. Jacob & Sons
**Shumac**
Italy, 200 bgs. J. E. Scott
" 100 R. Alexander & Co.
**Gutta Percha**—
China, 2 c. W. Pope & Co.
Germany, 3 bls. White, Child & Co.
B.W. Indies, 65 c. Jackson & Till
**Guano**—
Norway, 420 t. J. Jensen & Co.
**Glucose**—
Germany, 200 cwt. J. Barber & Co.
" 200 L. Sutro & Co.
" 187 Prop. Chamberlain's Wf.
" 8 R. Baur & Co.
" 400 Page, Son & East
" 300 J. F. Ohlmann
" 300 Fellows, Morton and Co.
" 240 "
" 440 De Paiva, Norman & Co.
" 160 Sothers & Dalman
" 300 Barrett, Tagant and Co.
France, 200 Weatherley & Co.
" 308 Henry & Co.
Belgium, 30 O. Pickford
" 80 L. Sutro & Co.
Germany, 350 "
" 400 E. Pink & Sons
" 100 Tolme & Runge
France, 200 Barrett, Tagant and Co.
Germany, 300 J. Barber & Co.
" 225 Pillow, Jones & Co.
" 20 Spies Bros. & Co.
" 400 Prs. Chamberlain's Wf.
" 200 P. W. Hore
**Isinglass**—
E. Indies, 5 pkgs. Kebbel, Son & Co.
" 5 L. & S. K. D. Co.
" 19 "
" 33 Clarke & Smith
**Manure**—
**Phosphate Rock**
France, 300 t. Anglo-Guano Wks.
Aruba, 275 G. M. Bauer
**Bone Meal**
E. Indies, 150 t. Bakewell, Bryden and Co.
" 32 Clarke & Smith
**Kainit**
Germany, 25 t. F. W. Berk & Co.
**Phosphate**
U. States, 200 bxs. Pickford & Co.
**Naphtha**—
Germany, 5 cks. Stein Bros.
**Potassium Iodide**—
Germany, 1 cs. J. W. Drysdale and Co.
**Phosphorus**—
Germany, 3 pkgs. A. Hagan

**Paraffin Wax**—
U. States, 50 brls. Mordaunt Bros.
" 85 Prop. Chamberlain's Wf.
" 225 J. H. Usmar & Co.
" 282 cs. G. H. Frank
**Pitch**—
Germany, 67 brls. E. & W. I. D. K. Co.
Belgium, 61 L. Fischel
**Pearl Ash**—
Holland, 96 c. F. W. Berk & Co.
**Potassium Sulphate**—
France, 50 cks. Petri Bros.
Germany, 94 H. Lambert
**Potassium Permanganate**—
Germany, 2 cs. Spies Bros. & Co.
**Plumbago**—
Germany, 40 cks. D. Storer & Sons
" 93 Wright & Ashbridge
**Potassium Prussiate**—
Holland, 7 cks.
**Potassium Carbonate**—
Holland, 10 cks. Charles & Fox
Germany, 10 cs. Becker & Ulrich
**Sodium Hyposulphite**—
Germany, 60 pkgs. J. James
**Saltpetre**—
Germany, 57 cks. J. Hall & Son
" 60 "
E. Indies, 50 bgs. W. Fletcher
" 1,061 C. Wimble & Co.
" 1,073 Ralli Bros.
" 792 Clift, Nicholson and Co.
Germany, 6 Tynke & King
**Stearine**—
France, 96 pkgs. H. Hill & Sons
Belgium, 64 "
U. States, 12 cks. C. Price & Co.
**Sodium Acetate**—
France, 100 c. Lister & Biggs
" 140 Hoare, Wilson & Co.
" 111 W. G. Blagden
**Soda**—
Germany, 220 c. Seaward Bros.
**Tartaric Acid**—
Holland, 5 cks. Middleton & Co.
" 9 C. Christopherson and Co.
" 64 Webb, Warter & Co.
Germany, 5 Augspurg, Kopf and Co.
Holland, 4 Middleton & Co.
Italy, 20 Webb, Warter & Co.
**Tar**—
Germany, 3 brls. Chilworth Gunpowder Co.
" 4 H. Lambert
France, 95 French Asphalte Co.
**Ultramarine**—
Belgium, 4 bls. Leach & Co.
Germany, 2 cs. Craven & Co.
Holland, 22 pkgs. A. Henry & Co.
" 21 cs. 2 cks. Haeffner & Co.
France, 3 cks. G. Rahn & Co.
**Verdigris**—
France, 1 ck. W. Harrison & Co.
" 1 C. Brumlen
" 1 E. & G. Hitch & Co.
**Zinc Oxide**—
Holland, 22 pkgs. W. Harrison and Co.
" 1 ck. Becker & Co.
Germany, 4 Blundell, Spence and Co.
" 20 J. Matton
" 10 "
Holland, 25 brls. M. Ashby

## LIVERPOOL.

*Week ending June 6th.*

**Acetate of Lime**—
New York, 300 bgs.
**Bones**—
Alexandria, 320 bgs.
Calcutta, 2,400
**Barytes**—
Hamburg, 23 cks.
**Cream Tartar**—
Barcelona, 5 cks. Wright, Crossley and Co.
" 9 "
**Ceresine**—
Hamburg, 17 cs.
**Camphor**—
Hamburg, 3 cs.
" 2 "
**Chemicals** *(otherwise undescribed)*
Rouen, 22 cks.
Hamburg, 9 cs.

**Caoutchouc**—
Para, 6 cs. R. Singlehurst & Co.
Accra, 15 pkgs. J. P. Werner
Salt Pond, 2 brls. 1 bx. Pickering and Berthoud
Accra 8 A. Herschell
Salt Pond, 1 1 cs. Bradbury & Co.
" 1 1 W. Griffiths & Co.
" 1 1 ck. C. Seegers
" 1 Fenn & Ellis.
Cape Coast, 1 Pickering & Berthoud
" 2 C. L. Clare & Co.
" 2 1 cs. 1 bg. Edwards Bros.
" 2 1 ck. Bennet, Brotherton & Co.
Axim, 8 bgs. Radcliffe & Durant
" 2 Pickering & Berthoud
Attoaboe, 14 bgs. "
" 29 Radcliffe & Durant
" 3 Edwards Bros.
" 2 M. E. Levin
Bathurst, 1 ck. 2 brls.
Goree, 38
**Dyestuffs**—
**Valonia**
Smyrna, 59 t. 20 bgs.
" 203¼ Barry Bros.
" 102 Essayen, Shahum & Co.
" 420 bgs. S. Spartali & Co.
**Madder**
Smyrna, 48 bls. C. M. Elliadi
Rotterdam, 3 cks.
**Myrabolams**
Bombay, 548 bgs. E. D. Sassoon & Co
" 620 B. Craig & Co.
" 2,298
**Extracts**
Antwerp, 3 cks. J. T. Fletcher & Co.
**Shumac**
Rotterdam, 17 cks
**Cochineal**
Grand Canary, 5 bgs. H. R. Toby
**Argols**
Bordeaux, 191 cks.
**Annatto**
Bordeaux, 2 cks.
**Glucose**—
New York, 250 brls.
Hamburg, 10 cks.
" 43
**Glycerine**—
Hamburg, 3 cbys. 1 brl.
Rouen, 10 cs.
**Gelatine**—
Rouen, 5 cs.
**Manure**—
**Phosphate Rock**
Port Royal, 1,920 t.
Beaufort, 2,100
**Waste Salt**
Hamburg, 300 t.
" 411 bgs.
**Phosphate**
Montreal, 518 t. Phosphate Lime Co.
Antwerp, 330
**Naphtha**—
New York, 5,322 brls.
**Pyrites**—
Huelva, 1,653 Matheson & Co.
" 1,438 "
" 1,385 Tennants & Co.
" 2,088 Matheson & Co.
**Potash**—
Montreal, 15 brls.
Rouen, 75 cks. 24 dms.
Dunkirk, 9
**Pitch**—
Antwerp, 20 cks.
**Potassium Sulphate**—
Dunkirk, 250 bgs.
**Salts of Potash**—
Hamburg, 973 bgs.
**Sugar of Lead**—
Hamburg, 3 cks.
**Saltpetre**—
Hamburg, 4 cks.
**Sulphur**—
Hamburg, 1 ck
**Salts Tartar**—
Rotterdam, 14 cks.
**Stearine**—
Rotterdam, 3 bxs.
Antwerp, 10 cs.
**Turpentine**—
Savannah, 400 brls.
**Tartaric Acid**—
Rotterdam, 10 cks.
**Tartar**—
Bordeaux, 7 cks.
**Ultramarine**—
Rotterdam, 29 cs. 11 cks. 40 brls.

**Verdigris**—
Bordeaux, 3 cks.
**Zinc Oxide**—
Hamburg, 50 cks.
Antwerp, 100 brls. J. T. Fletcher & Co.
" 100 cks.

## GLASGOW.

*Week ending June 9th.*

**Acetic Acid**—
Rouen, 9 pkgs.
**Alkali**—
Rotterdam, 150 bgs.
**Acetate of Lime**—
New York, 224 bgs.
**Alum**—
Rotterdam, 3 cks.
" 41
**Barytes**—
Rotterdam, 23 cks.
Antwerp, 22
**Borax**—
Hamburg, 1 ck.
**Chemical Balances**—
Antwerp, 4 bxs.
**Carbon**—
Philadelphia, 50 brls.
**Dyestuffs**—
**Alizarine**
Rotterdam, 58 cks.
" 20
**Extract**
Antwerp, 1 ck.
**Madder**
Bordeaux, 2 pkgs.
**Argols**
Bordeaux, 10 pkgs.
**Gutta Percha**—
Rotterdam, 40 bskts.
Amsterdam, 8 bgs.
**Glucose**—
Rotterdam, 2 cks.
Amsterdam, 15
**Pyrites**—
Huelva, 1,460 t. Tharsis Copper Co. Limited
" 1,180 "
**Pitch**—
Antwerp, 10 cks.
**Potash**—
Rotterdam, 20 cks.
**Potassium Bromide**—
Hamburg, 5 cs.
**Saltpetre**—
Hamburg, 13 cks. 5 kgs. J. Poynter and Son
**Stearine**—
Antwerp, 5 bgs.
**Tartar**—
Bordeaux, 14 pkgs.
**Ultramarine**—
Rotterdam, 4 cks. 4 cs.
" 2
**Zinc Oxide**—
Antwerp, 40 cks.
**Zinc Ashes**—
Bordeaux, 205 pkgs.

## HULL.

*Week ending June 7th.*

**Alumina**—
Rotterdam, 42 cks. W. & C. L. Ringrose
**Bones**—
Gualequaycha, 308 t.
**Bone Ashes**—
Gualequaycha, 270 t.
Libau, 763 bgs.
**Barytes**—
Bremen, 21 cks. Davis & Son
" 160
**Chemicals** *(otherwise undescribed)*
Hamburg, 82 pks. Wilson, Sons & Co.
Rotterdam, 3 cks. W. & C. L. Ringrose
Stettin, 32 Wilson, Sons & Co.
Bremen, 1 Veltmann & Co.
**Dyestuffs**—
**Madder**
Antwerp, 1 brl. Wilson, Sons & Co.
Rotterdam, 2 cks. Hutchinson & Son
" 9 G. Lawson & Sons
**Alizarine**
Rotterdam, 12 cks. Hutchinson & Son
" 2 "

**Alizarine**—*continued.*
Rotterdam, 20 cks. Lawson & Sons
" 23 W. & C. L. Ringrose
**Indigo**
Rotterdam, 15 chts. Wilson, Sons and Co.
**Valonia**
Astacos, 190 t.
**Myrabolams**
Bombay, 3,108 bgs.
**Glucose**—
Hamburg, 13 cks. Wilson, Sons & Co.
" 40 bgs. Hornstead & Co.
" 20 cks. Rawson & Robinson
" 12 Earle & Haller
Stettin, 12 Wilson, Sons & Co.
**Manure**—
**Manure** (*otherwise undescribed*)
Ghent, 140 t. Wilson, Sons, & Co.
**Bone Meal**
Bombay, 3,721 bgs.
**Naphtha**—
New York, 3,298 brls. Shaw, Thomson & Co.
**Pitch**—
Antwerp, 30 cks.
Amsterdam, 3
**Potash**—
Rotterdam, 43 cks.
**Saltpetre**—
Hamburg, 5 kgs. C. M. Lofthouse and Co.
" 10 pks.
" 22 cks.
**Tartaric Acid**—
Rotterdam, 3 cks. G. Lawson & Sons
" 2
**Tannin**—
Rotterdam, 20 cks. Hutchinson & Son
**Zinc Sulphate**—
Rotterdam, 11 cks. G. Lawson & Sons

## TYNE.

*Week ending June 9th.*

**Alumina Sulphate**—
Hamburg, 20 cks.
**Bones**—
Drontheim, 60 t.
**Glucose**—
Hamburg, 20 cks. Tyne S. S. Co.
**Naphthylamine**—
Rotterdam, 2 cks. Tyne S. S. Co.
**Pyrites**—
Drontheim, 125 t.
Pomaron, 1,200 Mason & Barry
**Sulphur Ore**—
Pomaron, 1,180 t. Mason & Barry
**Zinc Oxide**—
Antwerp, 60 brls. Tyne S. S. Co.

## GRIMSBY.

*Week ending June 9th.*

**Chemicals** (*otherwise undescribed*)
Hamburg, 6 pkgs.
**Kainit**—
Hamburg, 1,000 bgs.

## GOOLE.

*Week ending June 6th.*

**Muriate**—
Rotterdam, 31 cks.
**Soda**—
Rotterdam, 11 brls.
**Saltpetre**—
Antwerp, 170 bgs.
Hamburg, 13 kgs.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending June 4th.*

**Acid** (*otherwise undescribed*)
Adelaide, 20 cs. £30
Natal, 3 t. 10 c. 18
**Ammonia Carbonate**—
St. Petersburg, 2 t. 5 c. £63
Rouen, 1 2 26
Dunkirk, 1 19 52
**Alkali**—
Algoa Bay, 1 t. 5 c. £67
**Alum**—
Melbourne, 5 t. £24
Buenos Ayres, 50 brls. 25
**Ammonia Sulphate**—
Ghent, 300 bgs. £350
**Arsenic**—
Melbourne, 5 t. 2 c. £65
**Boracic Acid**—
Yokohama, 15 kgs. £30
**Bisulphide of Carbon**—
Philadelphia, 12 dms. £42
**Baryta Nitrate**—
New York, 12 pkgs. £24
**Borax**—
Hong Kong, 1 t. 3 c. £18
**Bone Ammonia**—
Demerara, 5 t. 18 c. £69
**Boric Acid**—
Melbourne, 10 c. £16
**Carbolic Acid**—
Yokohama, 20 cs. £42
Melbourne, 24 dms. 11
Calcutta, 30 34
Rotterdam, 25 cks. 197
Shanghai, 4 cs. 19
**Chemicals** (*otherwise undescribed*)
Kurrachee, 16 pkgs. £61
Philadelphia, 57 36
Bombay, 12 c. 57
Cape Town, 4 pkgs. 20
St. Petersburg, 5 cs. 100
Melbourne, 23 4 pkgs. 104
Shanghai, 22 cks. 75
Mauritius, 23 pkgs. 57
Bordeaux, 6 cks. 40
Hiogo, 9 cs. 406
**Cream Tartar**—
Townsville, 3 cs. £19
Brisbane, 13 c. 74
Sydney, 1 t. 131
Maryborough, 2 cs. 14
**Caustic Soda**—
Rockhampton, 5 t. 2 c. £47
Mauritius, 6 66
**Citric Acid**—
St. Petersburg, 6 csk. 15 c. £382
Hamburg, 6 cks. 263
Ghent, 2 c. 16
Buenos Ayres, 1 t. 10 c. 260
Monte Video, 5 40
Boston, 1 t. 15 294
Genoa, 15 126
Bremen, 15 kgs. 131
Rotterdam, 2 18
Amsterdam, 3 c. 27
New York, 1 t. 5 c. 220
Antwerp, 2 c. 18
**Camphor**—
Sydney, 1 cs. £18
**Copper Sulphate**—
Brisbane, 1 t. £22
**Clarifiants**—
Bordeaux, 55 cks. £132
**Disinfectants**—
Bombay, 12 t. 1 c. £115
Hamburg, 8 50
Sydney, 40 cs. 120
**Ehrmannite**—
Mauritius, 11 t. 2 c. £300
**Guano**—
Mauritius, 590 bgs. £320
**Hyposulphite of Lime**—
New York, 3 cs. £42
**Hyposulphite of Soda**—
New York, 3 cs. £42
**Lime Water**—
Kurrachee, 50 kls. £65
**Manure**—
Hamburg, 35 t. 12 c. £435
Riga, 145 12 355
Copenhagen, 195 3 761
Rotterdam, 56 3 225
Nevis, 12 cks. 66
Barbadoes, 118 bgs. 130 t. 157
Antigua, 26 cks. 170
Sydney, 10 t. 40
Berbice, 6 90
Oporto, 10 20
Demerara, 23 cks. 4 t. 18 c. 138
Cullera, 631 8 5,386
Malaga, 19 15 105
Adra, 62 14 627
Trinidad, 100 cs. 625
St. Lucia, 19 t. 19 c. 199
**Muriatic Acid**—
Auckland, 20 cs. £17
**Oxalic Acid**—
Antwerp, 1 t. 16 c. £50
Rouen, 4 16 150
Paris, 16 cks. 128
**Oxalate Potash**—
Ghent, 5 t. 11 c. £145
**Potassium Bromide**—
Sydney, 2 cs. £20
**Potassium Chlorate**—
Yokohama, 100 kgs. £256
Odessa, 5 12
Hiogo, 8 t. 15 c. 462
**Phosphorus**—
Adelaide, 1 t. £250
Hiogo, 5 c. 74
Sydney, 23 cs. 231
**Potassium Sulphate**—
Mauritius, 21 t. £197
**Phosphoric Acid**—
Demerara, 4 t. £46
**Potassium Muriate**—
Madras, 5 t. £50
**Sulphur**—
Keppel Bay, 23 t. 17 c. £112
**Salammoniac**—
Yokohama, 10 cks. £78
Monte Video, 5 brls. 17
**Soda Ash**—
Yokohama, 27 t. 2 c. £118
Rockhampton, 2 11 17
Launceston, 5 2 30
**Soda Crystals**—
Sydney, 50 t. 1 c. £118
Hiogo, 25 61
**Sheep Dip**—
Cape Town, 10 t. 13 c. £435
New York, 13 8 640
Natal, 90 cs. and 1 t. 14 c. 389
Melbourne, 370 dms. 10 cks. 440
**Strontia Nitrate**—
New York, 32 pkgs. £66
**Sodium Sulphide**—
Lyttleton, 2 t. 6 c. £20
**Saltpetre**—
Mauritius, 4 t. 18 c. £103
Amsterdam, 0 10 15
New York, 2 10 53
Rio Janeiro, 7 7 161
Montreal, 2 15 56
Santos, 3 0 68
Rotterdam, 0 9 17
Lisbon, 3 15 78
Barbadoes, 20 0 400
**Sulphuric Acid**—
Singapore, 18 c. £12
Algoa Bay, 25 cs. 38
**Superphosphate**—
Mauritius, 31 t. 3 c. £465
**Tartaric Acid**—
Buenos Ayres, 1 ck. £18
Townsville, 2 c. 17

## LIVERPOOL.

*Week ending June 6th.*

**Ammonia Muriate**—
New York, 13 t. 10 c. £330
Philadelphia, 22 4 502
Havre, 1 25
**Ammonia Sulphate**—
Teneriffe, 16 c. 1 q. £10
Grand Canary, 2 t. 2 25
Barbadoes, 54 19 2 618
Las Palmas, 5 3 2 63
Demerara, 102 17 1 1,337
St. Nazaire, 10 118
Valencia, 266 18 3,163
San Francisco, 2 10
**Ammonia Carbonate**—
New York, 5 t. 11 c. £207
Marseilles, 12 22
**Alum**—
Rosario, 1 t. 16 c. £10
Constantinople, 1 17 9
London (Ont.) 1 1 9
Toronto, 6 2 32
Montreal, 1 16
Syra, 9 14 46
Santos, 5 3 q. 12
Riga, 2 18 10
Quebec, 7 9 39
Patras, 1 5 6
**Antimony**—
Corunna, 5 c. £9
**Alkali**—
East London, 4 c. 1 q. £5
**Ammonia, Liquid**—
Cabenda, 3 c. 1 q. £5
**Arseniate Soda**—
Montreal, 1 t. 17 c. £28
**Borax**—
Halifax, 6 c. £9
Adelaide, 11 21
Rosario, 17 27
St. John, N.B., 11 3 q. 18
**Bone Manure**—
Grand Canary, 10 t. £32
**Bone Waste**—
Rouen, 4 t. 11 c. £27
**Brimstone**—
Calcutta, 5 t. 0 c. 2 q. £24
**Bleaching Powder**—
Baltimore, 377 cks.
**Bleaching Powder**—*continued.*
Boston, 137 pps. 113 180 tcs.
Callao, 3 brls.
Ghent, 47
Havana, 4
Havre, 25
Naples, 41
Passages, 80
Riga, 86
Rouen, 56
Valparaiso, 2 cs.
Vera Cruz, 10 brls.
**Calcium Chloride**—
New York, 13 t. 10 c. £48
**Cream Tartar**—
Montreal, 10 c. 2 q. £63
Halifax, 10 3 64
**Carbon**—
New York, 8 t. 17 c. 3 q. £102
**Chemicals** (*otherwise undescribed*)
Constantinople, 1 t. 8 c. 1 q. £46
Alexandria, 5 2 9
Gothenburg, 6 2 10
Beyrout, 15 24
St. John, N.B. 28 3 28
Rotterdam, 20 16 1 £25
Galatz, 13 1 20
Havre, 75 5 324
Patras, 6 2 10
Volo, 4 6
Samsoun, 6 1 10
New York 4 9 196
**Copper Sulphate**—
Bilbao, 16 t. 3 c. 2 q. £343
Rouen, 90 4 1,577
Venice, 2 1 1 137
Genoa, 5 1
Montreal, 5 2 102
Riga, 2 1 1 41
Antwerp, 6 8 3 138
Algiers 2 10 3 50
Marseilles, 22 18 453
Rosario, 5 113
Bordeaux, 2 4 41
Oporto, 15 1 23
**Carbolic Acid**—
Rouen, 2 t. 4c. £30
New York, 3 228
**Copperas**—
Volo, 6 t. 8 c. 2 q. £11
**Charcoal**—
Nantes, 25 t. £110
Hamburg, 25 4 c. 104
**Charcoal Refuse**—
Hamburg, 77 t. 13 c. 2 q. £290
**Citrochloric Acid**—
Barcelona, 5 c. £12
**Caustic Potash**—
Volo, 4 c. 3 q. £8
Antwerp, 1 t. 0 3 23
**Chromate Iron**—
Trieste, 3 t. 3 c. 1 q. £31
**Caustic Soda**—
Alicante, 40 dms.
Amsterdam, 9
Barcelona, 80 brls. 50
Batoum, 31
Bordeaux, 30
Boston, 100
Galatz, 20
Gothenburg 36
Havana, 30
Lisbon, 10
Marseilles, 350
Melbourne, 35
Naples, 30
Newfairwater, 130

**Caustic Soda**—*continued.*
New York, 500 dms.
Parahyba, 20
Philadelphia, 100 brls.
Riga, 169
Rouen, 345
San Francisco, 150
Seville, 32
Singapore, 10
Stettin, 13
Tampico, 100
Valencia, 30 28

**Disinfecting Powder**—
Bombay, 13 t. £28
Hamburg, 4 c. 8

**Glycerine**—
Vera Cruz, 2 c. 3 q. £5
Antwerp, 5 t. 6 233
Rio Grande do Sul, 1 cs. 28

**Iron Nitrate**—
Bombay, 4 cs. £12

**Manure**—
St. Malo, 263 t. 17 c. 3 q. £1,668

**Magnesium Chloride**—
Rouen, 5 t. 15 c. £12

**Oxalate Potash**—
Barcelona, 5 t. 4 c. £110

**Oxalic Acid**—
Barcelona, 5 t. 3 c. 3 q. £110
Gothenburg, 14 2 18

**Potashes**—
Santos, 10 c. 1 q. £12
Ghent, 3 t. 66

**Potassium Chlorate**—
Philadelphia, 7 t. 10 c. £383
Hamburg, 1 8 75
Genoa, 3 10 190
Santos, 2 112
New York, 10 544
Gothenburg, 10 25
Hong Kong, 10 25

**Potassium Bichromate**—
Havre, 11 t. 15 c. £375
Havana, 4 3 q. 9

**Phosphate of Lime**—
Hamburg, 19 t. 10 c. £78

**Sodium Bichromate**—
Leghorn, 1 t. £34

**Sheep Dip**—
Monte Video, 4 t. 10 c. £100

**Sulphur**—
St. John, N.B., 8 t. 17 c. £58
Montreal, 3 1 1 q. 18
Bahia, 5 14 1 36
Rouen, 20 9 93

**Salammoniac**—
Genoa, 1 t. 5 c. 3 q £45
Montreal, 5 3 9
Alexandretta, 3 2 6
Philadelphia, 4 8 3 142
Seville, 12 19

**Soap Extract**—
Melbourne, 8 t. 5 c. £276

**Saltpetre**—
Syra, 5 t. 15 c. £183
Larnaca, 1 5 27
Bahia, 3 2 3 q. 71

**Saltcake**—
Baltimore, 55 t. 3 c. £106

**Sodium Nitrate**—
Shanghai, 5 t. 0 c. 1 q. £50
Seville, 3 1 2 30

**Sulphur Ore**—
Shanghai, 60 t. £150

**Sugar of Lead**—
Havana, 5 c. 2 q. £12

**Soap Powder**—
Antwerp, 2 t. £70

**Sodium Acetate**—
Naples, 10 c. £11

**Salt**—
Antwerp, 468 t.
Baltimore, 1,530
Bata, 10
Bilbao, 2
Brass, 30
Brisbane, 105
Calcutta, 8,710
Cameroons, 213
C. C. Castle, 11
Chicago, 160
Christiansund, 4,220
Chittagong, 3,100
Demerara, 164
Fernando Po, 5
Halifax, 298
Lagos, 20
Newfairwater, 192
New Orleans, 747
New York, 285
Opobo, 34
Portland, 200
Rotterdam, 109
St. John, N.B., 70

**Salt**—*continued.*
St. John, N.'fld., 10 t.
San Francisco, 268
Sierra Leone, 200
Sydney, 25
Trinidad, 24
Wyburg, 420

**Sodium Bicarbonate**—
Antwerp, 40 kgs. 4 cks.
Bilbao, 6 brls.
Bordeaux, 30 kgs. 10 cks.
Genoa, 82
Havre, 50
Marseilles, 25
Melbourne, 370
Monte Video, 40 100 brls.
Montreal, 450
Rotterdam, 60
Salonica, 20

**Soda Crystals**—
Rotterdam, 15 brls.

**Soda Ash**—
Baltimore, 293 tcs. 799 cks.
Boston, 112 137
Buenos Ayres, 250 brls.
Corfu, 50
Melbourne, 370
Montreal, 91
New York, 721 tcs. 237
Philadelphia, 95
Rio de Janeiro, 50 brls.
Smyrna. 150

**Stearine**—
Carthagena, 5 cks.

**Tin Crystals**—
Lisbon, 9 c. £38

**Tartaric Acid**—
Bilbao, 1 c. £9

**Tar**—
Algoa Bay, 75 dms.
Honolulu, 200

**Verdigris**—
New York, 9 c. £28

**Zinc Chloride**—
Genoa, 5 c. 2 q. £5

## GLASGOW.

*Week ending June 9th.*

**Ammonia**—
Italy, 5 tcs. £50

**Chemicals** *(otherwise undescribed)*
New York, 15 pkgs.
Italy, 71 cks. £120

**Charcoal**—
Rouen, 34 t. 5 c. £68

**Dyewood**—
Montreal, 4 t. 14 c. £39

**Epsom Salts**—
Christiania, 14 t. 16 c. £38
Montreal, 6 4 25

**Glauber Salts**—
Italy, 5 t. 8 c. £20

**Iron Oxide**—
Penang, 1 t. 17 c. £22

**Leather Waste**—
Antwerp, 0 t. 12 c. £28
Rouen, 1 15 23

**Naphtha**—
Rouen, 18 t. £400

**Potassium Bichromate**—
Japan, 1 t. 7 c. £51
Rotterdam, 33 cks. 480
" 5 76
Rouen, 35 t. 9 c. 152
Italy, 215
" 138

**Pitch**—
Dunkirk, 370 t.

**Paraffin Wax**—
Penang, 1 t. 11 c.
Italy, 5 14
Rouen, 2 17

**Saltpetre**—
Quebec, 4 t. 9 c. £94

**Sodium Bichromate**—
Antwerp, 5 t. 2 c. £160
Rotterdam, 60 cks. 511
Italy, 403
Rouen, 17 t. 2 c. 495

**Soda Ash**—
New York, 29 t. 13 c. £128

**Tar**—
Norrkoping, 750 brls.

## HULL.

*Week ending June 5th.*

**Ammonia Sulphate**—
Dunkirk, 50
Antwerp, 20

**Alkali**—
Libau, 100 kgs.
Trieste, 3 cks.
Venice, 10

**Bleaching Powder**—
Bergen, 3 cks.
Christiania, 35

**Chemicals** *(otherwise undescribed)*
Antwerp, 4 cs. 20 pkgs.
Amsterdam, 10
Bergen, 25 cks.
Bremen, 5
Bari, 14 25 pkgs.
Bordeaux, 10
Christiania, 80
Constantinople, 20
Copenhagen, 1
Dantzic, 6
Drontheim, 2 cs.
Dunkirk, 1 ck
Ghent, 20 pkgs.
Gothenburg, 15 cs. 5 cks. 11
Hamburg, 55 9 27
Helsingfors, 1
New York, 150 50
Odessa, 184 133
Palermo, 10
Rouen, 52
Rotterdam, 26 21
Riga, 48
Stockholm, 5
St. Petersburg, 20
Stavanger, 20
Stettin, 10
Trieste, 92
Venice, 10
Wyburg, 3

**Caustic Soda**—
Bari, 54 dms.
Dantzic, 100
Helsingfors, 23 cks.
Libau, 73
Palermo, 6
Reval, 20
St. Petersburg, 33
Venice, 50
Wyburg, 11

**Creosote**—
New York, 150 brls.

**Dyestuffs** *(otherwise undescribed)*
Antwerp, 3 cks.
Christiania, 50 bgs.
Gothenburg, 40
Hamburg, 26 1 kg. 1 ck.
Reval, 30 cks.
St. Petersburg, 4 cks.
Stettin, 120 bgs.

**Manure**—
Ghent, 500 bgs.
Hamburg, 50
Rotterdam, 820

**Pitch**—
Antwerp, 350 t.

**Tar**—
Amsterdam, 12 cks.
Bergen, 5
Christiania, 6
Christiansand, 5
Dantzic, 1
Hamburg, 5
Odessa, 200
Rotterdam, 6
Stettin, 3

## TYNE.

*Week ending June 9th.*

**Alkali**—
Antwerp, 10 t. 10 c.
Stettin, 1 0
Gothenburg, 27 6
Copenhagen, 64 2

**Ammonia Sulphate**—
Antwerp, 50 t.
Valencia, 71
Rotterdam, 20 9 c.

**Alum**—
Wasa, 1 t.

**Bleaching Powder**—
Hamburg, 19 t. 6 c.
Gothenburg, 10 10
Terneuzen, 19 4
Lisbon, 14 17
Antwerp, 32 4
Wasa, 1 9
St. Petersburg, 39 10
Copenhagen, 6 19
Gutujewsky, 5 2
Stettin, 63 4
Rotterdam, 30 11

**Barytes Carbonate**—
Antwerp, 20 t.
Stettin, 206 1 c.

**Caustic Soda**—
Hamburg, 12 t. 18 c.
Antwerp, 6 2
Gutujewsky, 5 1
Stettin, 1 9
Rotterdam, 3 14
Gothenburg, 13 2
Wasa, 7 5
Ancona, 2 16

**Chemicals** *(otherwise undescribed)*
Horsens, 10 t. 5 c.

**Copperas**—
Rotterdam, 10 t. 9 c.
Stettin, 5 7
Fredericia, 1 3

**Flint (ground)**—
St. Petersburg, 5 t. 15 c.

**Litharge**—
Hamburg, 1 t. 3 c.
Stettin, 1 14
Lisbon, 2 7
Gothenburg, 0 11

**Magnesia**—
Hamburg, 1 c. 2 q.

**Magnesium Carbonate**—
St. Petersburg, 11 c. 2 q.

**Paraffin Wax**—
Malmo, 8 t. 4 c.

**Potassium Chlorate**—
Antwerp, 0 t. 15 c.
St. Petersburg, 5 12
Stettin, 0 10
Copenhagen, 4 10

**Pitch**—
Gijon, 200 t.

**Soda**—
Holbeck, 30 t. 2 c.
Aarhuus, 91 19
Antwerp, 10 15
Gothenburg, 6 19
Esbjerg, 25 1
Fredericia, 64 11
Horsens, 32 9
Guernsey, 2 3
Karrebeksminde, 25 10
Lisbon, 5 2
Svendborg, 6 14
Wasa, 5 11
Odense, 22 19
Ancona, 197 16
Randers, 39 17
Thisted, 100 5
Rotterdam, 14 7

**Sodium Carbonate**—
Malmo, 5 t. 7 c.

**Sodium Chlorate**—
Hamburg, 0 t. 10 c.
Rotterdam, 1 2

**Soda Ash**—
Hamburg, 5 t. 8 c.
Antwerp, 3 0
Gothenburg, 51 8
Lisbon, 33 8
Wasa, 36 18
" 3 3
Copenhagen, 11 2

**Superphosphate**—
Valencia, 40 t.

**Sodium Sulphate**—
Lisbon, 5 t.
" 5 2 c.

**Sodium Bicarbonate**—
Stettin, 1 t.
Rotterdam, 1
Gothenburg, 1 5 c.
Copenhagen, 1 12

**Salammoniac**—
Wasa, 9 c.

## GRIMSBY.

*Week ending June 9th.*

**Chemicals** *(otherwise undescribed)*
Antwerp, 1 ck.
Dieppe, 40 bottles.

## GOOLE.

*Week ending June 6th.*

**Benzol**—
Rotterdam, 60 cks.

**Chemicals** *(otherwise undescribed)*
Boulogne, 20 cks.
Ghent, 8
Hamburg, 13

**Coal Products**—
Dunkirk, 55 cks.

**Manure**—
Antwerp 168 bgs.
Rotterdam, 301

**Pitch**—
Antwerp, 213 t

# PRICES CURRENT. [THURSDAY, June 14, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | | £ | s. | d. |
|---|---|---|---|---|
| **Acids :—** | | | | |
| Acetic, 25 % | per cwt. | 0 | 8 | 3 |
| ,, Glacial | per lb. | 0 | 0 | 6½ |
| Arsenic, S.G., 2000° | per cwt. | 0 | 12 | 0 |
| Chromic 82 % | per lb. | 0 | 0 | 6 |
| Fluoric | ,, | 0 | 0 | 3¾ |
| Muriatic (Tower Salts), 30° Tw. | per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. | ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. | per lb. | 0 | 0 | 2¼ |
| Nitrous | ,, | 0 | 0 | 2 |
| Oxalic | ,, | 0 | 0 | 3 |
| Picric | ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) | per ton | 15 | 0 | 0 |
| ,, (monohydrate) | ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) | ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) | ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) | ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) | ,, | 1 | 5 | 0 |
| Tannic (pure) | per lb. | 0 | 1 | 2½ |
| Tartaric | ,, | 0 | 1 | 6 |
| Arsenic, white powdered | per ton | 11 | 15 | 0 |
| Alum (loose lump) | ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) | ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) | ,, | 4 | 12 | 6 |
| Ammonia, ·880=28° | per lb. | 0 | 0 | 3½ |
| ,, =24° | ,, | 0 | 0 | 1¾ |
| ,, Carbonate | ,, | 0 | 0 | 3½ |
| ,, Muriate | per ton | 22 | 0 | 0 |
| ,, ,, (sal-ammoniac) | per cwt. | 34/- & 32/- | | |
| ,, Nitrate | per ton. | 42 | 10 | 0 |
| ,, ,, (pure) | ,, | 71 | 10 | 0 |
| ,, Phosphate | per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London | per ton | 11 | 15 | 0 |
| ,, ,, (grey), Hull | ,, | 11 | 15 | 0 |
| Aniline Oil (pure) | per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, | ,, | 0 | 0 | 8¼ |
| Antimony | per ton | 37 | 10 | 0 |
| ,, (tartar emetic) | per lb. | 0 | 1 | 1 |
| Barium Chloride | per ton | 7 | 5 | 0 |
| ,, Carbonate (native) | ,, | 4 | 15 | 0 |
| ,, Sulphate (native levigated) | ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % | ,, | 7 | 5 | 0 |
| ,, Liquor, 7 % | ,, | 2 | 12 | 6 |
| Bisulphide of Carbon | ,, | 11 | 10 | 0 |
| Calcium Chloride | ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk | ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes :—** | | | | |
| Alizarine (artificial), 20 % | per lb. | 0 | 0 | 9 |
| Magenta | ,, | 0 | 3 | 9 |
| **Coal-Tar Products :—** | | | | |
| Anthracene, 30 %, f.o.b. London, per unit | per cwt. | 0 | 1 | 5 |
| Benzol, 90 % nominal ,, | per gallon | 0 | 2 | 4 |
| ,, 50/90 ,, | ,, | 0 | 2 | 3 |
| Carbolic Acid (crystallised 35°) | per lb. | 0 | 1 | 2 |
| ,, (crude 60°) | per gallon | 0 | 3 | 11 |
| Creosote (ordinary) | ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) | ,, | 0 | 0 | 1¾ |
| Crude Naphtha, 30 % @ 120° C. | ,, | 0 | 1 | 1 |
| Grease Oils, 22° Tw. | per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston | ,, | 0 | 13 | 0 |
| Solvent Naphtha, 90 % at 160° | per gallon | 0 | 1 | 2 |
| Coke-oven Oils (crude) | ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) | per ton | 82 | 15 | 0 |
| ,, Sulphate | ,, | 21 | 10 | 0 |
| ,, Oxide (copper scales) | ,, | 75 | 0 | 0 |
| Glycerine (crude) | ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) | ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) | ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) | ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) | ,, | 2 | 0 | 0 |
| Lead (sheet) for cash | ,, | 13 | 10 | 0 |
| ,, Litharge Flake (ex ship) | ,, | 15 | 0 | 0 |
| ,, Acetate (white, ,, ) | ,, | 25 | 10 | 0 |
| ,, ,, (brown, ,, ) | ,, | 20 | 10 | 0 |
| ,, Carbonate (white lead) pure | ,, | 18 | 10 | 0 |
| ,, Nitrate | ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) | ,, | 7 | 15 | 0 |
| ,, ,, (grey) | ,, | 12 | 0 | 0 |
| Magnesium (ribbon and wire) | per oz. | 0 | 2 | 3 |
| ,, Chloride (ex ship) | per ton | 2 | 0 | 0 |
| ,, Carbonate | per cwt. | 1 | 17 | 6 |
| ,, Hydrate | per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) | per ton | 2 | 10 | 0 |
| Manganese, Sulphate | ,, | 17 | 10 | 0 |
| ,, Borate | per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % | per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. | per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent | ,, | 0 | 3 | 9 |
| ,, ,, Miscible, 60° o.p. | ,, | 0 | 4 | 10½ |
| **Oils :—** | | | | |
| Castor | per cwt. | 1 | 3 | 0 |
| Cotton-seed | per ton | 22 | 0 | 0 |
| Linseed | ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° | ,, | 7 | 15 | 0 |
| Petroleum, Russian | per gallon | 0 | 0 | 5¾ |
| ,, American | ,, | 0 | 0 | 6 |
| Potassium (metal) | per oz. | 0 | 3 | 10 |
| ,, Bichromate | per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % | per ton | 16 | 7 | 6 |
| ,, Chlorate | per lb. | 0 | 0 | 5½ |
| ,, Cyanide, 98 % | ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % | p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % | ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % | ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) | per cwt. | 1 | 2 | 9 |
| ,, Permanganate | ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow | per lb. | 0 | 0 | 6½ |
| ,, Sulphate, 90 % | per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % | ,, | 7 | 15 | 0 |
| Silver (metal) | per oz. | 0 | 3 | 6 1/16 |
| ,, Nitrate | ,, | 0 | 2 | 7½ |
| Sodium (metal) | per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % | per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % | ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 58 % | ,, | 4 | 10 | 0 |
| ,, ,, (Soda Crystals) | ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) | ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) | ,, | 21 | 0 | 0 |
| ,, Chlorate | per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) | per ton. | 29 | 10 | 0 |
| ,, Bichromate | per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) | per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda) | ,, | 7 | 2 | 6 |
| ,, ,, (70 % Caustic Soda) | ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) | ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) | ,, | 5 | 11 | 3 |
| ,, Bicarbonate | ,, | 5 | 0 | 0 |
| ,, Hyposulphite | ,, | 5 | 7 | 6 |
| ,, Manganate | ,, | 6 | 15 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool | per cwt. | 0 | 9 | 0 |
| ,, Nitrite, 98% | per ton | 28 | 0 | 0 |
| ,, Phosphate | ,, | 16 | 10 | 0 |
| ,, Prussiate | per lb. | 0 | 0 | 5 |
| ,, Silicate (glass) | per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) | ,, | 4 | 0 | 0 |
| ,, Sulphate (Salt-cake) | ,, | 1 | 10 | 0 |
| ,, ,, (Glauber's Salts) | ,, | 1 | 10 | 0 |
| ,, Sulphide | ,, | 8 | 15 | 0 |
| ,, Sulphite | ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % | ,, | 6 | 15 | 0 |
| Sugar, Beet | per cwt. | 0 | 13 | 9 |
| ,, Cane | ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium | per lb. | 0 | 0 | 7½ |
| ,, Barium | ,, | 0 | 0 | 5 |
| ,, Copper, 60% | ,, | 0 | 0 | 8 |
| Sulphur (Flowers) | per ton | 8 | 5 | 0 |
| ,, (Roll Brimstone) | ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool), | ,, | 4 | 1 | 3 |
| Superphosphate of Lime (28 %) | ,, | 2 | 5 | 0 |
| Tallow | ,, | 26 | 0 | 0 |
| Tin (metal) | ,, | 81 | 0 | 0 |
| ,, Crystals | per lb. | 0 | 0 | 6½ |
| Zinc (Spelter) | per ton | 16 | 5 | 0 |
| ,, Chloride (solution, 96° Tw.) | ,, | 5 | 2 | 6 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, June 23, 1888.**


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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

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As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

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## TECHNICAL INSTRUCTION.

### THE PROFESSOR AND THE STUDENT.

JUDGING by inference that knowledge of a useful character can only be obtained by the help of an instructor, we are under no obligation to show the *raison d'etre* of the professor; still, it is perhaps incumbent upon us to prove the necessity of the student. Those who desire, or who are forced to follow some employment from sheer necessity, will no doubt have studied beforehand their suitability towards any particular trade or profession, though we must say, judging from our own experience, this does not always seem to be the case. In many instances a student has no opportunity of judging whether or no any individual line will suit his special case until he has been carried into the thick of the fray, and it is too late to retract. The opposite of this forms the special feature of the common schools of the Continent, more particularly in France, where commercial work is actually engaged in before a boy has to make a choice as to what calling he will eventually follow. There is but little opportunity in England for a lad to have any real choice of his own, and the question is often asked by parent to parent—What are you going to make your son? without either of them ever thinking that without the lad's own free-will it is impossible to *make* him anything but a common-place individual.

Over and over again, cases can be pointed to in this country where a student has found himself absolutely unsuited to the profession to which he has been articled, and by his own energy and perseverance he has struck out a fresh path of his own, and has excelled in it without the aid of any instructor whatever. But men of this calibre are few, and the ordinary student would not progress favourably unless under the systematic training of an instructor whose duty is, or should be, to put himself so in touch with his pupils as to command their esteem and respect, and who will be ready to follow his lead as a faithful guide and friend.

It is this fellow-feeling that has endeared the German chemists to their former teachers and the professors to their students, and it is the absence of a similar feeling in this country, except in a few instances, that has stagnated the progress of industrial chemistry.

If a professor is needed at all it is for the purpose of instructing his pupils, and in several distinguished seats of learning in this country it is a common complaint that the professor is never seen amongst his students, being always in his own private research laboratory, and even the instructor to whom the general teaching of the students is left is too much engaged with his own private work to give his undivided attention to his students. It would be invidious to mention names. What we have sketched here is a true picture, and is not a solitary instance, and explains much that has been privately said, that very often indeed does a pupil in an outside laboratory progress far more satisfactorily than in a large college or university, and simply because his instructor takes an interest in his work and sees that he does it correctly.

Judging from a chemical standpoint the existence of the present state of things is a standing disgrace to the educational system of this country. The student is sent to college mainly to have the advice and assistance of some one who is supposed to devote a little time to one of the chief duties of his office, and if the student does not get the Professor's attention, can it be wondered at that he fails to receive any satisfactory employment, and that foreigners, who have been well cared for in their educational establishments, fill the most lucrative posts in our commercial enterprises? The disease is a serious one but it is not incurable, and it is only by some one speaking out boldly that it will be properly diagnosed.

## ZINC STATISTICS, PRODUCTION 1880-1887.

| | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|---|---|---|---|
| Rhine Provinces and Belgium..... | 98,830 | 110,989 | 119,193 | 123,891 | 129,240 | 129,754 | 129,020 | 130,995 |
| Silesia ..... | 47,459 | 66,497 | 68,811 | 70,405 | 76,116 | 79,623 | 81,630 | 81,375 |
| Great Britain ..... | 22,000 | 24,419 | 25,581 | 28,661 | 29,259 | 23,099 | 23,730 | 19,339 |
| France and Spain ..... | 15,000 | 18,358 | 18,075 | 14,671 | 15,341 | 14,847 | 15,305 | 16,028 |
| Poland ..... | 4,000 | 4,000 | 4,400 | 3,733 | 4,164 | 5,019 | 4,145 | 3,580 |
| Austria ..... | 4,400 | 4,270 | 5,094 | 4,672 | 4,470 | 3,890 | 3,760 | 3,566 |
| United States ..... | 23,239 | 30,000 | 30,147 | 32,921 | 34,415 | 36,321 | 38,072 | 45,530 |
| Totals ..... | 214,928 | 258,533 | 271,301 | 278,954 | 293,005 | 29,2553 | 29,5662 | 300,413 |
| Average price of Zinc in London ... | £18 7 0 | £16 5 6 | £16 19 9 | £15 6 6 | £14 8 9 | £14 0 0 | £14 5 0 | £15 4 0 |

## A NEW CHEMICAL PATENT.

AT the general meeting of the Vereingte Chemische Fabriken zu Leopoldshall which has just been held in Germany, Dr. Borsche read an interesting lecture upon the construction of factories for the manufacture of potash, hydrochloric acid, and chloride of lime, according to a new patented method which we find described in *Kuhlow's Review*. A special factory will be erected for each article and will be sufficiently large for 2,000,000 or 2,500,000 kg. of hydrochloric acid, and 5,000,000 kg. of carbonate of potassium to be manufactured. The savings of the company would suffice for putting up the new factories. The patent is in the names of Drs. Borches and Brunnies. The proprietors of the patent will receive 10 per cent. of the clear profit derived by the company, and 25 per cent. on the sale of licenses.

## MACHINERY AT THE GLASGOW EXHIBITION.

A VERY fine selection of machinery used in the manufacture of locomotives is shown by Sharp, Stewart and Co., Glasgow, formerly of Manchester. It includes a self-acting slotting machine; self-acting sliding, screw-cutting, and surfacing lathes; and a screwing machine which screws and taps at one cut. The fact that this firm has recently removed from Manchester to Glasgow shows how largely the manufacture of locomotives is becoming concentrated on the banks of the Clyde. The reason of that is that locomotives are now made chiefly for export. The great British railway companies make their own engines in their own works; and the ordinary makers, who make chiefly for foreign countries and the colonies, find it most convenient to have their works near a great seaport. Mirrlees, Watson, and Co., Glasgow, have working a horizontal steam-engine with automatic cut-off gear by which a part of the machinery in the section is driven. The chief exhibits of this firm consist of machinery connected with the manufacture of sugar. They include a four-roller sugar mill, and a new concentrator called the "Yaryan," suited for treating sugar liquors, with a vacuum pumping-engine for exhausting it. Most of the machinery in the section is driven by a large Westinghouse automatic engine furnished by Alley and Maclellan, Glasgow. The same firm shows their sentinel reversing engine, which works with great rapidity, accuracy, and ease; and their steam steering gear on the same principle, as well as an ingenious automatic ash-hoist, now extensively used in the British, Spanish, and Italian navies. On the wire rope of the hoist there is a knob so fixed that, when the ash-pan reaches the deck, the knob strikes a lever which puts the hoist out of gear and so stops it. Blair, Campbell, and M'Lean, Glasgow, show a large and very fine collection of copper machinery and vessels for the distilling and rectifying of spirits; vacuum pans for the boiling of liquids *in vacuo*, and for making concentrated essences. The Farnley Iron Company, Leeds, shows the Farnley flue, with spiral corrugation; and the Leeds Forge Company shows the Fox flue, made of machine-rolled steel. The latter firm also shows a waggon side-frame and a locomotive side-frame, each in one piece. One of the most wonderful machines in the section is a Turbo-electric generator, shown by Clarke, Chapman, Parsons, and Co., Gateshead. It represents great power put up in small compass; for it weighs only 3¾ cwt., and, making 9,000 revolutions a minute, it maintains 45 lights of 16-candle power. These qualities adapt it well for use on board of ships, and it is already much used in the navy and ocean-going steamers. A dynamo compound, by Greenwood and Batley, Leeds, worked with constant potential, supplies the current that drives a drilling machine by the same firm, and also lights the exhibit. From the foundry of G. and J. Weir, Glasgow, there comes a patent feed-water heater, and pumps for supplying steam boilers with non-corrosive feed-water, all fitted with automatic controlling gear, evaporator, and condensor for producing fresh water. These pumps are quite new and are being extensively introduced into the ships of the Royal Navy, as well as into merchant vessels.

## STORING PETROLEUM.

THE OIL RESERVOIRS AT BAKU.

ACCORDING to Mr. Gulishambareff, who is a most indefatigable collector of statements in regard to the Russian petroleum industry, the cost of the reservoirs at Baku (which is fixed according to their capacity), averages about 5½ roubles per poud. The rouble keeps fluctuating so much in value that it is difficult so fix on an average quotation for turning Russian money into English, but taking it roughly at two shillings for purposes of calculation, the following is the cost of reservoirs at Baku:—

| | | |
|---|---|---|
| 13,500 | gallons ..... | £110 |
| 45,000 | ,, ..... | 230 |
| 112,500 | ,, ..... | 400 |
| 225,000 | ,, ..... | 700 |
| 450,000 | ,, ..... | 1200 |
| 675,000 | ,, ..... | 1650 |

As the British Government has been incubating for a couple of years, a new law dealing with the storage of petroleum, sending Colonel Majendie to America to examine the storage system there, although it is said there is no storage in the United States on such a vast scale as in Russia, it may be interesting to point out that up to now this immense storage of oil has been carried on without a single serious accident or catastrophe. The danger of oil storage does not depend upon the quantity of oil stored in a given spot, but upon the area of exposure. This was aptly illustrated during one of the sittings of the Government Committee appointed to inquire into the proposed concession for the crude pipe line from Baku to the Black Sea. The question of the safety of oil stored on a large scale having cropped up, a Russian engineer experienced in petroleum matters placed on the table one of those large Russian vodky bottles that hold several gallons and have a very small neck. This was filled to the neck with kerosine, and the officials were invited to smell it from time to time. The gas emitted from such a small surface exposed to the air was naturally so trifling that there was scarcely any odour at all. After a while he produced a large dinner plate, poured a few spoonfuls of kerosine upon it, and put it upon the table. In a few minutes the heat of the room caused a perceptible odour to prevail, and the president had to have the plate taken away. The smaller the surface of oil exposed to the air the smaller the vapour emitted, and thus it is that a few barrels of oil leaking in a shed are more dangerous than 10,000 gallons of petroleum stored in a tight iron tank. Should, by any exceptional means, the vapour on the surface of a tank holding several hundred thousand gallons of oil ignite, by filling up the tank with steam the blaze can be extinguished at once.

## CHEMICAL ENGINEERING.*

### VI.

HAVING now ascertained the chief characters of the non-metallic elements that are used in the construction of chemical apparatus, we must now turn our attention to the metals and alloys which find uses in this direction. The principal metals only will be treated of here as the more rarely used may conveniently be mentioned under any special heading in which they occur. Before taking the metals individually, it will be as well to put before you several tables so that you will be able to compare their physical qualities, and thus possess *prima facie* evidence of the various operations to which they are best suited.

Expansion by heat and contraction by cold are two properties of great importance in metals, and indeed in all other substances; but in metals especially is it necessary to take these physical properties into consideration in the construction of chemical apparatus. Together with expansion may be conveniently noted the fusing point, and these form the subject matter of the next table:—

**Table X.**

| Metal. | Sp. gr. | Fusing point ° C. | Coefficient of linear expansion for 1° C. |
|---|---|---|---|
| Nickel | 8·82 | ? | 0·00001286 |
| Iron (wrought) | 7·84 | 1550 | 0·00001220 |
| ,, (cast)* | 7·50 | 1275 | 0·00001075 |
| Copper | 8·92 | 1050 | 0·00001698 |
| Lead | 11·37 | 335 | 0·00002948 |
| Tin | 7·29 | 226 | 0·00002296 |
| Zinc | 7·14 | 412 | 0·00002941 |
| Antimony | 6·71 | 440 | 0·00001158 |
| Platinum | 21·53 | 2000 | 0·00000901 |

* White. Grey cast-iron has a sp. gr. of 7·18.

The specific heat, and the relative conducting power of the metals for heat and electricity may with advantage be tabulated here, and the student will find the middle column of figures very useful when considering the construction of chemical plant; the capacity of stills, the length of worms and coils for heating and condensing and for evaporative purposes, all depend upon the relative conductive capacity of the materials employed.

**Table XI.**

| Metals. | Conducting power for electricity. | Heat conducting power. | Specific heat, water 1·0. | Latent heat of fusion. |
|---|---|---|---|---|
| Silver | 100·0 | 100·0 | 0·0560 | 21·111 |
| Iron | 16·8 | 11·9 | 0·1138 | 129·444 |
| Nickel | 13·1 | — | 0·1086 | |
| Copper | 99·9 | 77·6 | 0·0921 | |
| Lead | 8·3 | 8·5 | 0·0314 | 5·369 |
| Tin | 12·3 | 14·5 | 0·0562 | 14·252 |
| Zinc | 29·0 | 19·9 | 0·0955 | 28·102 |
| Antimony | 4·6 | — | 0·0507 | |
| Platinum | 18·0 | 8·2 | 0·0324 | |

Leaving now what might be called the thermics of the case we may proceed to what are purely engineering quantities, and which are none the less important than those which have already been described; weight, tensile strength, malleability, ductility, and tenacity are all properties which have to be taken into account in the construction of plant. The following table will show the great variations occurring amongst this class of substances:—

**Table XII.**

| Metals. | Weight in lbs. of one sq. ft. one inch thick. | Tensile strength tons per sq. inch. | Tenacity lead = 1. | Order of Malleability. | Order of Ductility. |
|---|---|---|---|---|---|
| Wrought-iron | 40·0 | 22·0 | 27 | 7 | 3 |
| Steel | 41·6 | 52·0 | 42 | 6 | 2 |
| Copper | 45·8 | 26·0 | 18 | 1 | 4 |
| Lead | 59·1 | 1·5 | 1 | 4 | 7 |
| Zinc | 37·5 | 3·3 | 2 | 5 | 5 |
| Tin | 37·9 | 2·0 | 1·3 | 2 | 6 |
| Platinum | 119·6 | — | 15 | 3 | 1 |

We may now examine the capabilities of some of these metals individually for their uses in the construction of chemical plant and apparatus.

Iron.—Cast and wrought-iron are largely employed for operations in which chemicals are engaged, not because this metal is unacted upon by the various acids and alkalies that are disengaged in the processes, but because it is a cheap metal, easily cast and wrought into a variety of forms, and when it wears away it is easily replaced. It is well known that iron is easily soluble in dilute acids, yet an iron pot is employed for the manufacture of saltcake, iron pipes for the partial cooling of hydrochloric acid gas, and for many years parting of gold and silver by sulphuric acid has been done in cast-iron vessels. I could cite many more instances in which iron is used in connection with substances generally supposed to act upon it chemically, but instead of doing so call your attention to the fact that chemical substances act more upon some kinds of iron than others, and the strength of the chemical substances have much to do with the matter. Cast-iron is not so readily attacked by acids as wrought-iron, while on the contrary, wrought-iron is more easily attacked by alkalies and sulphides of the alkalies. Then again we may even divide cast-irons and wrought-irons into two qualities, viz., those easily attacked and others less easily, so that in the foundry special mixtures of pig are used for specific purposes. The action of acids and acid gases upon cast-iron is very peculiar: to take for instance the action of hydrochloric acid gas, at temperatures between 300° (169° C.) and 700° (371° C.) this gas has but little action, while above 800° (426° C.) it attacks the metal very energetically, forming chloride of iron and liberating hydrogen. The action is so severe that even thick pipes are soon eaten through. Cast-iron stands the action of acids, diluted to a moderate degree, very well, and even wrought-iron will last a long time if the acid be sulphuric and is not allowed to become weak from absorption of moisture. In St. Helens and Widnes district, wrought-iron boilers are used for the conveyance of oil of vitriol by rail from works to works. On the continent the aniline colour works store concentrated oil of vitriol in large iron boilers, as immense stocks of this article are kept in store by them. Concentrated sulphuric acid has so little action upon cast-iron, even at a boiling temperature, that vitriol is actually rectified in it. In 1877 I sold oil of vitriol which had been rectified in a cast-iron vessel, and it was found that the acid so produced did not contain any more iron in solution than when rectified in the ordinary way.

As to the action of alkalies, it is well known to all of you acquainted with chemistry, that caustic soda is boiled down and fused in cast-iron pots; when concentrated to the strength of 60 per cent. cream caustic, that is, when the lye still contains some 10 per cent. of water, wrought-iron is certainly attacked, as is plainly seen by the appearance of the scoop handles when they are made of wrought-iron. I have, moreover, collected the hydrogen given off during the action, but I am not able to say positively whether the solution of the iron took place by reason of the action of the caustic soda or by the action of the impurities, especially sulphides, which we know all commercial caustic soda liquor contains.

When iron is employed for purely physical work and chemical action scarcely enters into the calculation, I am afraid I cannot tell you much that is not already known, without it be the selection of quality for various purposes. Thus, at one time the bottom plates of stills exposed to high temperatures were made of Low Moor iron, but now steel plates have become the fashion, having been introduced with very good results. Steel plates have also been made to replace iron in boiler flues with quite as good results.

The chemical composition of various kinds of iron does not give us any definite information to go upon, still as I have said before, it exhibits the finger-post of caution, as the differences between the various qualities are very great, and may be seen by the following analyses:—

**Table XIII.**

| | Cast-iron. Grey. | Cast-iron. White. | Wrought-iron. Puddled bar. | Steel. Krupp. |
|---|---|---|---|---|
| Iron | 91·10 | 89·86 | 99·31 | 99·25 |
| Manganese | 0·78 | 2·72 | — | 0·01 |
| Graphite | 2·64 | 0·57 | 0·30 | 0·53 |
| Combined carbon | 1·28 | 2·32 | | |
| Silicon | 3·78 | 1·02 | 0·12 | 0·03 |
| Phosphorus | 0·05 | 0·91 | 0·14 | trace. |
| Sulphur | 0·16 | 1·07 | 0·13 | trace. |
| Titanium | 0·19 | 0·18 | — | trace. |
| | 99·98 | 98·65 | 100·00 | 99·82 |

In construction, wrought-iron is employed where tensile

* A course of lectures delivered by Mr. George E. Davis at the Manchester Technical School.—*All rights reserved.*

strength is required, and cast-iron to resist crushing. Girders are made of both wrought and cast-iron.

I have already given you a formula for the strength of wooden beams, and it may suffice to tell you that this formula with the simple alteration of the coefficient K to 68 for wrought-iron, and 46 for cast-iron will be suitable for iron beams also; but iron beams are very seldom, if ever constructed in the same form as timber, they usually take the form of flanged girders, and are either of cast-iron, rolled girders, or girders built up of wrought-iron, and therefore a special formula is necessary in order to ascertain what weight they will safely carry.

For cast-iron girders, if—

D = Depth of girder in inches.
A = Area of bottom flange in inches.
S = Span in inches.
W = The breaking weight in tons;

then $$W = \frac{25\,A\,D}{S}$$

when the girder is supported at both ends and the weight is on the centre; but when the load is distributed the following formula should be employed:—

$$W = \frac{50\,A\,D}{S}$$

when compressed, iron may be made to bear a strain of 5 tons to the square inch with safety, and wrought-iron may be strained in tension to a like amount. A safe load for iron structures should not however exceed one-sixth of the breaking weight.

The following table showing the safe load for rolled girders, now so extensively employed, may be found useful:—

**Table XIV.**

| Rolled Girders. Depth of girder. | Width of flanges. | Weight in lbs. per foot run. | Safe distributed load for these spans. 10ft. | 12ft. | 14ft. | 16ft. | 18ft. | 20ft. | 23ft. |
|---|---|---|---|---|---|---|---|---|---|
| 6in. | 5in. | 27 | 6½ | 5½ | 4½ | 3½ | 3⅛ | 2½ | 2 |
| 7 | 4 | 20 | 5¼ | 4⅜ | 4 | 3½ | 3 | 2⅜ | 2 |
| 8 | 4 | 26 | 8 | 6½ | 5 | 4 | 3½ | 3¼ | 3 |
| 8 | 5 | 28 | 9 | 7½ | 7 | 5⅝ | 5 | 4 | 3 |
| 9¼ | 3¾ | 24 | 8 | 6½ | 5½ | 4⅝ | 4 | 3½ | 3 |
| 9½ | 4½ | 27 | 9¼ | 7¾ | 6⅝ | 5¾ | 5¼ | 4⅝ | 3½ |
| 10 | 4½ | 30 | 12 | 10 | 8½ | 6⅝ | 5½ | 5 | 3⅝ |
| 10 | 5 | 35 | 13⅜ | 11 | 9½ | 8⅜ | 7⅜ | 6¾ | 5½ |
| 10 | 6 | 56 | 18 | 15 | 12¾ | 11 | 10 | 9 | 8½ |
| 12 | 5 | 42 | 21 | 16 | 15 | 13 | 12 | 10 | 8 |
| 12⅜ | 5¼ | 53 | 25¼ | 21 | 16 | 13½ | 12¼ | 11 | 8¼ |
| 12 | 6 | 57 | 27 | 25 | 21 | 19 | 16 | 14 | 12 |
| 14 | 6 | 60 | 30 | 24 | 21 | 19 | 16 | 14½ | 13 |

I may now wind up the description of iron with a few practical rules.

**To find the weight of a wrought-iron Vessel.**

A = Area of plates in square feet.
T = Thickness of metal in eighths of an inch.
W = Weight in lbs. without rivets.

$$W = 5 \times A \times T.$$

For single riveted vessels used for chemical purposes allow seven rivets to the lineal foot of joint, ¾ of an inch diameter, 1⅛in. long, and 2in. breadth of lap for the plates.

**To find the weight of a cast-iron Vessel.**

$$W = 5 \times A \times T \times 0{\cdot}93.$$

**To find the weight of round iron.**

A = Sectional area in inches.
L = Length in feet.
D = Diameter in inches.
W = Weight in lbs.

$$W = L \times D^2 \times 2{\cdot}64.$$

**To find the weight of flat bar iron.**

$$W = A \times L \times 3{\cdot}34.$$

**To find the weight of cast-iron pipes.**

D = Outside diameter of pipe in inches.
$d$ = Inside " "
$w$ = Weight per lineal foot in lbs.

$$w = (D^2 - d^2)\ 2{\cdot}45.$$

In connection with the foregoing rules the following tables will be found useful:—

**Table XV.**

**Birmingham Wire Gauge, in Decimals of an inch.**

| B.W.G. | Decimals of an inch. | B.W.G. | Decimals of an inch. | B.W.G. | Decimals of an inch. |
|---|---|---|---|---|---|
| 1 | 0·312 | 13 | 0·095 | 25 | 0·020 |
| 2 | 0·284 | 14 | 0·083 | 26 | 0·018 |
| 3 | 0·261 | 15 | 0·072 | 27 | 0·016 |
| 4 | 0·239 | 16 | 0·065 | 28 | 0·014 |
| 5 | 0·217 | 17 | 0·056 | 29 | 0·013 |
| 6 | 0·208 | 18 | 0·049 | 30 | 0·012 |
| 7 | 0·187 | 19 | 0·042 | 31 | 0·010 |
| 8 | 0·166 | 20 | 0·035 | 32 | 0·009 |
| 9 | 0·158 | 21 | 0·032 | 33 | 0·008 |
| 10 | 0·137 | 22 | 0·028 | 34 | 0·007 |
| 11 | 0·125 | 23 | 0·025 | 35 | 0·005 |
| 12 | 0·109 | 24 | 0·022 | 36 | 0·004 |

**Table XVI.**

**Birmingham Plate Gauge, in Decimals of an inch.**

| No. | Decimals of an inch. | No. | Decimals of an inch. | No. | Decimals of an inch. | No. | Decimals of an inch. |
|---|---|---|---|---|---|---|---|
| 1 | 0·004 | 10 | 0·024 | 19 | 0·065 | 28 | 0·120 |
| 2 | 0·005 | 11 | 0·028 | 20 | 0·068 | 29 | 0·125 |
| 3 | 0·008 | 12 | 0·034 | 21 | 0·070 | 30 | 0·130 |
| 4 | 0·010 | 13 | 0·036 | 22 | 0·075 | 31 | 0·135 |
| 5 | 0·012 | 14 | 0·040 | 23 | 0·078 | 32 | 0·140 |
| 6 | 0·013 | 15 | 0·045 | 24 | 0·080 | 33 | 0·145 |
| 7 | 0·015 | 16 | 0·050 | 25 | 0·095 | 34 | 0·150 |
| 8 | 0·016 | 17 | 0·055 | 26 | 0·100 | 35 | 0·157 |
| 9 | 0·019 | 18 | 0·060 | 27 | 0·110 | 36 | 0·165 |

In putting cast-iron work together "rust joints" are frequently employed. To make such joints dissolve 1 oz. of muriate of ammonia in enough water to moisten 1 cwt. of iron borings, and use freshly mixed, with a caulking tool. In order to arrive at the weight of borings necessary for any joint multiply the length in feet by the breadth in inches, by the thickness in eighths of an inch and by 0·3, the product will be the weight of dry borings required.

*(To be continued.)*

## GLASGOW INTERNATIONAL EXHIBITION.

THIRD NOTICE.

BY the time these additional notes appear in type, this exhibition will have run six weeks of its appointed course. It has, so far, been favoured with a measure of success which hardly even the most sanguine could have hoped for, and a wind-up well within the limits of financial safety is now certain, unless the final auditing of the accounts should disclose something of egregious folly and extravagance in the department of executive expenditure and outlay—a contingency which is not looked for in any quarter. The greater part of the daily visiting force is made up of mere pleasure hunters, but objection must not be taken to that, for their money is as good as the best, and without it there could be no possibility of so filling a treat as is here provided for the *bonâ-fide* student in industries, science, or art. Switchbacks, shooting galleries, gondolas, and curling ponds (the "roaring game" on counterfeit ice in hot July, is certainly something of an absurdity, and will partly bear out the long-established conviction of the foreigner that we Britons love to take our pleasure laboriously) may therefore be more than tolerated by the reflective mind, although there has been growling on the part of some at so large an infusion of the "fun of the fair" and Punch and Judy element. The attractions in the grounds certainly conduce to the comfort of the studious visitor within the building, and except on settled wet days the various courts suffer not at all from congestion, which is a mercy. Courts 8, 9, and 10, set apart for chemicals, continue to attract a very fair quota of attention from the more observant of the visitors, and the brilliancy of the display is admitted on all hands. Having in our issue of May 26th noticed at some length the chief English and foreign exhibits in this section (English exhibitors distinctly preponderate here), something is now to be said concerning the Scotch or native contributions.

Outstanding as an industry peculiar to Scotland is the shale oil or paraffin manufacture, and, of course, it is represented here. Not numerously however, for out of about fifteen great concerns which make up the whole, three only have come forward as exhibitors. Still these are the pick of the shale distilling force, and the three exhibits amply suffice as an illustration of almost every corner of the industry. The Broxburn Oil Company, in addition to stand

in Court 8, have in the machinery section a stall where the manufacture of paraffin candles is daily seen in process, forming an exhibit of the most interesting kind alike to the trade and to the individual consumer. The candle moulds and attendant mechanism are of ingenious conception. The contents of the show case, Court 8, include samples of finished candles in great variety and beauty of colour; also scale and wax from which these are made, along with specimens of market products got from shale in a diversity and abundance well calculated to astonish the novice. These include all forms of mineral oils, paraffins, naphthas, and sulphate of ammonia, with samples of crude and spent shale. Young's Paraffin Company have a similar display (exclusive of the candle factory) in a somewhat larger case, the effect of which is very fine, greatly enhancing the general brilliancy of the Court. The third exhibitor within this class is the Pumpherston Oil Company—smaller, but quite effective, with similar specimens, including a fine block of paraffin wax and a pair of busts in the same material. Private workers in paraffins (chiefly for candle making purposes) are represented in the same Court by Robin and Houston, Glasgow, with scale, wax, candles in process of manufacture, and the finished article, in considerable variety of colour; and A. Ogston and Son, Aberdeen, with similar illustrations. These are also soap makers, of which material in various devices the exhibits are largely made up. Other adjacent exhibitors of makes of Scotch soap are Sutherland and Abercrombie, Henry's Company, Isdale and McCallum, Dougal and Sons, and Alexander Whitelaw,—all creditable, but much outshone by the large English makers they adjoin, whose exhibits were spoken of in a former notice.

Passing to Court 10, the strongest of all in chemicals, the stand of the Glasgow Alum and Ammonia Company deserves a chief mention amongst the Scotch exhibitors here. They show alum, sulphate of alumina, sulphate of ammonia, ammoniacal liquors, naphtha, pitch, etc., the central object being a column of fine alum on pedestal. They also show two immense blocks of alum, each of about 16 tons net weight, according to the carting contractor's certificate, but these are placed remotely in a somewhat unfrequented quarter of the machinery section, and have not the chance they deserve. Also in Court 10 is the much admired case of the Hurlet and Campsie Alum Company, resplendent in the rich colours of its crystals of yellow and red prussiate of potash. The exhibit also includes alum shale, native sulphate of ammonia, crude carbonate of potash, etc. R. and J. Garroway, Glasgow, exhibit a case of very varied contents, all of which are destined afterwards, it seems, for the South Kensington Museum. The samples include vitriols, acids, salts, muriates, sulphates, nitrates, etc., in great variety; the case is a thoroughly representative one, and covers a wide chemical field. Adjoining, are two stands devoted to oils chiefly, by John Sandeman, Glasgow (rosin, oils, mineral greases, and printing inks), and MacArthur and Jackson, Glasgow (a great variety of fish, animal, vegetable, and mineral oils, chiefly for lubricating and batching). These are useful as examples of goods dealt in by the private refiner. In Court 9 are found the leading examples of the Scotch bichromate manufacture: that of J. and J. White, Glasgow, making the most effective display, perhaps, their various products worked into coronal and other devices, and coming out in remarkable beauty and purity of colour. The Eglinton Chemical Company likewise illustrate the bichromate industry with effect; their stand containing at the same time samples of bleaching powder, and other chemical makes of the firm. There are two other Eglinton cases elsewhere in the exhibition, one showing goods in leather tanned by the firm's patent quick chromate process, and the other bricks of silicate, etc., for smelting and glass furnaces. Gray, Gorman, and Co., Glasgow, have a case in Court 9—not large, but valuable as a pretty complete exposition of the indigo industry, and the only one found here. The case is confined solely to this feature, showing samples of native indigo, and indigo extracts of evident worth. A neighbouring case illustrates the chemical possibilities of kelp and seaweed (a marine crop once of great importance on the Scotch north-western coasts, for a long time neglected, but now making some headway again), with samples of iodine and potash salts, chlorate of potash, etc. These are shown by the North British Chemical Company. Another case (A. B. Fleming and Co., Edinburgh) shows the well-known Fleming letter-press and other inks; also a select variety of oils and lubricating greases. A strong feature is made of the firm's patent solidified oil, which is said to be comparatively unaffected in consistency or viscosity by variations of climate and temperature however marked. These exhaust the chief Scotch examples in the three chemical Courts. In Court 7 J. and J. G. Scott, Glasgow, have a case with specimens of chemicals used in the making of colours; also samples of paints, colours, oils, and varnishes, these all of merit apparently. In Court 3 is the interesting stand of Nobel's Explosives Company, with a great variety of illustrative specimens, of which, of course, the explosives themselves are in harmless counterfeit only.

Members of the Society of Chemical Industry, having this year selected Glasgow as the place of annual congress, will be over the exhibition in considerable force early next month. The afternoon of July 4th has been officially indicated as the time of general gathering there, and on succeeding days concerted visits will be paid by the Society to the Forth Bridge, Broxburn Oil Company's works, Nobel's Explosives works, and other centres of interest.

## OIL STORAGE IN RUSSIA.

ACCORDING to a list drawn up for the Minister of Finance at the end of last year, when the kerosine tax was being examined in Council, the tank storage of oil in Russia possesses a capacity of over 100 million gallons. It may be interesting to reproduce this list, as it shows at a glance where the principal oil depôts of Russia have been established :—

| | Capacity of tanks in gallons. |
|---|---|
| Astrakhan | 1,350,000 |
| Tsaritzin | 31,500,000 |
| Saratoff | 9,900,000 |
| Batraki | 2,475,000 |
| Nijni Novgorod | 7,425,000 |
| Perm | 1,350,000 |
| Domino (near Orel) | 18,355,500 |
| Griazi | 4,500,000 |
| Moscow | 4,500,000 |
| St. Petersburg | 3,600,000 |
| Warsaw | 2,475,000 |
| Libau | 1,224,000 |
| Kieff | 621,000 |
| Rostoff on the Don | 555,750 |
| Kharkoff | 527,400 |
| Odessa | 2,700,000 |
| Batoum | 20,250,000 |
| Total gallons | 114,308,650 |

This list does not include the capacity of the hundreds of tank reservoirs at Baku itself. The principal place, it will be seen, is Tsaritzin, the commencing point of the railway system on the river Volga. It is here that the majority of the tank steamers discharge their cargoes, although in the last year or two Saratoff has been coming into favour, and many tank vessels also proceed further north to Nijni Novgorod, which is rapidly becoming an important oil depôt. Domino, the depôt near Orel, having a storage capacity of over eighteen million gallons of kerosine, is the property of the Nobel firm. It is from there that the winter distribution of oil takes place, Domino, from the close of the navigation season on the river Volga, supplying the towns with oil for hundreds of miles round about. Most of the iron reservoirs have been erected within the last five or six years, and new ones are continually being added. In 1883, for instance, Batoum did not contain a single oil reservoir. The capacity of the many tanks now existing there exceeds twenty million gallons.

## AMERICAN ANILINE TRADE.

IN last week's issue of the *Reporter*, reference was made to the aniline industry from a foreign standpoint, and the fresh information which the article contained, has been commented upon favourably by the domestic manufacturers but exceptions are taken to the statement that the industry is suffering on the other side. A representative of a leading concern in the United States, who is familiar with the progress of events abroad, states that dividends were declared this spring, by the factories in Germany, ranging from 9 to 16 per cent. This would indicate that the aniline industry is on a better footing, but the profits are probably realised from the exclusive sale of special colours. Taken as a whole,

the improvement has not been marked because sharp competition in the regular line of colours prevents a profitable business. The American aniline makers claim to be pursuing a very unsatisfactory trade so far as profits are concerned, still they manage to continue in operation and make ends meet by their diversified and extended productions in certain lines. However, there is no disputing the fact that more money has been lost than what has been made by their enterprise, but a goodly portion of the assets on hand consist of large modern factories which will be of service for years to come.

The tariff law is blamed for causing all the mischief to the home industry; it is argued that if the raw materials were free, with 35 per cent. duty on the dyes, the change would have a remarkable effect in building up a trade that has been languishingfor some years. Particular stress is laid on beta naphthol, dinitrotoluole, ortho and para toluidine, dimethylaniline, benzole, and a few other raw materials, the free entry of which is desired to compete successfully with imported dyes. It makes little difference at the moment whether benzole is dutiable or otherwise, as the value of that article is higher and scarcer abroad than here, but the future may bring about a change. There is only one factory in the United States for making crude products, while four aniline works are to be supplied with material. In this respect the German industry has the advantage. There is an opening in the United States, but no one is anxious to take hold.

There is a hesitancy to accept the published statement that coal is burned in England to get the tar, and the fact is pointed out that considerable tar is produced by the coke ovens without injuring the quality of the coke. No doubt there is a great waste of hydrocarbons in the coke industry of the United States, but we understand that all by-products abroad are saved and utilised. Very little, if any, benefit is looked for from the petroleum source, owing to the failure of experiments which were made on a large scale in Cleveland some years ago to convert the fat hydrocarbons of petroleum into the aromatic hydrocarbons of coal-tar. Benzole at that time was at its highest price, and considerable inducement was offered for successful experiments; the effort in that direction has not been repeated since, but a genius will yet appear who can solve the problem. Previous failures may discourage but not kill the enterprise which is waiting on necessity. The future supply of benzoles is expected to come from the coke-ovens.

The importation of coal-tar colours are increasing, and at a greater rate than shown by the Government figures. Only the money value of the imports is given in the official reports, and the fact that prices have ruled much lower during the past nine months, than during the same period in 1887, would make the increase so far this year at least from 20 to 30 per cent. The latter represents the advance made in this country by foreign coal-tar colours during the short time stated, and confirms the general belief that anilines are making rapid strides in consumptive channels. There is no complaint from the home industry of decreasing trade, but on the contrary the outlet is said to be enlarging to an encouraging extent, and if prices were more satisfactory the aniline trade would be one of the most prosperous in existence. Those identified with it are determined to remain as they see better times ahead—*Oil, Paint, and Drug Reporter.*

## THE THARSIS COMPANY AT THE GLASGOW EXHIBITION.

A MOST interesting and attractive exhibit is that of the Tharsis Sulphur and Copper Company Limited. It consists of a large model of the Tharsis mines, showing an area of about six square miles, which is accompanied by an oil painting of the North Lode Opencast. At the base of the exhibit are grouped specimens of the ironstone outcrop of the lodes—cupreous schist, cupreous pyrites, burnt ore, purple ore, and the last named material converted into blocks for use in blast furnaces. Large show-cases on either side contain a series of specimens illustrative of the industry as carried on at the mines for the production of cement copper, and also samples of native copper and natural stalactite sulphate of copper. Many Phœnician and Roman antiquities are also shown, which have been discovered in the course of the company's operations, including a large glass urn with human bones, tear bottles, perfumery bottles, glass bowls, clay lamps and mugs, nails, coins, and various bronze articles. The show-case on the other side contains illustrations of the operations carried on at the company's works in this country, showing the successive stages in the treatment of the ore, ending in the metals fitted for manufacture. Copper slabs, weighing from 36 cwt. downwards, billets and ovals for the manufacture of solid drawn tubes, wire bars and ingots of the various classes of copper, including the high-class conductivity quality required for electrical purposes, are also shown. An interesting feature is the exhibition of the chief metals contained in one pound of the ore, and the gold and silver contained in 100 tons of the original mineral. The silver has been cast as a bell, and weighs 136½ oz., while the gold weighs 5½ oz. The Tharsis Company was formed in 1866, and have in this country six metal-extracting works, situated at Glasgow, Tyne, Widnes, Oldbury, and Cardiff. They are also proprietors of a very large extent of land in the mining district of the Province of Huelva, Spain, the mines chiefly worked being at Tharsis and Calanas, all connected by the company's railway system with their shipping pier at Huelva, about 30 miles distant from Tharsis. The branch line to Calanas is about 20 miles long. It is believed that these mines have been known since 1000 years B.C., and both Phœnician and Carthagenian remains have been found there, while very complete and extensive Roman workings still exist. The mineral contains about 50 per cent. sulphur, 45 per cent. iron, 3 per copper, with small quantities of gold, silver, lead, zinc, bismuth, nickel, antimony, arsenic, and silicon.

# Parliamentary Jottings.

### CONSULAR FEES ON SHIPPING.

Mr. O. V. Morgan asked the Under-Secretary for Foreign Affairs whether he had yet received an answer from Her Majesty's Minister at Washington as to the reason why shippers from England to the United States were charged a declaration fee of 2s. 6d. on each invoice in addition to the Consul's fee, while shippers from Germany to the United States paid no declaration fee.—Sir J. Gorst: A letter containing the substance of the report on the subject received from Her Majesty's Minister at Washington was addressed to the hon. member yesterday. If he requires any further information I would suggest that he should communicate again with the Foreign Office, where the matter is receiving attention.

### TRADE WITH VENEZUELA.

Mr. Howell asked the Under-Secretary for Foreign Affairs whether the additional 30 per cent. *ad valorem* duty upon all goods imported was still enforced by Venezuela; and whether the trade between Trinidad and Venezuela had now virtually ceased to exist.—Sir J. Gorst: We have no information that this additional duty has ceased to be levied. It is not a fact that trade between Trinidad and Venezuela has now virtually ceased to exist, but there was a falling-off in 1887 as compared with 1886 of £10,246 in value of imports to Trinidad (excluding bullion in transit)—viz., from £179,274 to £169,028; and in exports of £26,722—viz., from £168,585 to £141,863.

### MINISTRIES OF COMMERCE.

Mr. Causton asked the Under-Secretary for Foreign Affairs whether the Government had instituted any inquiry or obtained any information from foreign Governments showing the difference of organization between the Board of Trade in this country and the Ministers of Commerce of foreign Administrations; and, if not, whether they would do so.—Sir J. Gorst: No such inquiry has been recently instituted, but if the hon. member will furnish the Foreign Office with particulars of the information he desires to obtain and the countries from which it should be procured reports will be called for.

### PERUVIAN BONDHOLDERS.

In answer to Mr. Hunter, Sir J. Gorst said,—Perhaps the hon. member will allow me to answer this question. On the 12th of April last Mr. Fraser announced that the Chilian Government had made confidential proposals to Her Majesty's Government for the amendment of the articles of the Grace-Aranibar contract to which they had taken exception, and also proposals for the settlement of the claims of the bondholders against Chili. These proposals, so far as relates to the contract, has been transmitted in the form of a protocol, which was signed by Her Majesty's Minister at Santiago *ad referendum*, and the Chilian Government, in a separate document, have submitted certain bases of arrangement for a combined settlement of the bondholders' claims on Chili and

Peru. The proposals, being confidential, cannot be laid on the table.

EMPLOYERS' LIABILITY BILL.

This Bill was ordered to be referred to the Standing Committee on Law.

ELECTRIC LIGHTING ACT (1882) AMENDMENT BILL.

This Bill was read a third time.

TRUCK PRACTICES.

Mr. Bradlaugh asked the Secretary of State for the Home Department whether he had received a communication, signed by two shareholders in the Rhymney Iron Company and by two tradesmen resident in Rhymney, alleging the persistent continuance of truck practices at Rhymney; and whether any, and what, steps were being taken by the Inspector of Factories in the matter.—Mr. Matthews: I have received such a communication, and counter-communications from the directors of the company. The whole matter has been referred to the chief inspector for full inquiry, and for such action as appears suitable when the facts are ascertained.

LEICESTERSHIRE MINERS AND SPECIAL RULES.

Mr. Fenwick asked the Home Secretary whether he had received from the Leicestershire district objections to special rules, and whether he intended to take any steps to see that the wishes of the workmen were duly and properly attended to.—Mr. Matthews: Yes, sir, I have received such objections. With the view of meeting the wishes of the workmen in this district certain amendments of the special rules were prepared by the inspector, approved by me, and proposed to the owners, by whom they have generally been accepted.

MANAGERS OF MINES AND THE HOME OFFICE.

Mr. Burt asked the Home Secretary whether his attention had been called to complaints that persons who had acted as under-managers of mines for many years had been refused certificates of service; whether it was true that in cases of refusal to grant such certificates no reason or explanation had been given to the applicant; and whether, considering the dissatisfaction that existed and the interest taken in the subject, he would state the method of procedure and the principles that guided the Home Office in dealing with certificates of service.—Mr. Matthews: Yes, Sir, I have received such complaints. In the first instance no reason for refusal is given, but if remonstrance is made the reasons are set forth in detail. I consider my duty to be limited to ascertaining whether the candidate possesses the statutory qualification—viz., whether he has exercised functions substantially corresponding to those of an under manager. I have no right to exercise any discretion as to whether the candidate is otherwise personally qualified. The method of procedure is to refer each application to the inspector of the district, who reports to me whether, in fact, the candidate possesses the statutory qualification. The two main principles, speaking generally, by which I have been guided are—first, that the applicant shall have been next in authority to a certificated manager; and secondly, that he shall have exercised control over a separate mine, or such part as might under the statute have constituted a separate mine.

THE UDSTONE COLLIERY INQUIRY.

Mr. D. Crawford asked the Secretary of State for the Home Department whether he would lay upon the table the minutes of evidence taken before the Udstone Colliery inquiry.—Mr. Matthews: If the hon. member will refer to pages 10 to 14 of the report he will see that they contain an abstract of the evidence given by the principal witnesses, both as to the facts and the cause of the explosion. Under these circumstances I hope the hon. member will not press me to incur the serious expense of printing a verbatim copy of the evidence, which is very bulky. I shall be happy to show it to the hon. member.

PAYMENT OF TELEGRAPHISTS.

Mr. Fenwick asked the Postmaster-General whether, if a large number of the staff at the Central Telegraph Office were found to be in favour of weekly instead of fortnightly payment of wages, he would take steps to comply with their request.—Mr. Raikes said that any officer in the Post Office was at liberty to apply to him through the usual official channel, and should the staff at the Central Telegraph Office submit an application he would give it attentive consideration. It would, of course, be premature to give any promise as to future action until the requirements of the service and the wishes of the officers had received fuller consideration.

## THE EDGWARE-ROAD FIRE.

AT the inquiry into the circumstances attending the deaths of Emma Margaret Edwards, Agnes Hyland, Martha Wiley Berry, Ellen Cowell, Anna Glew, and Jane Bowie, who lost their lives in the fire which occurred on the morning of May 30, on the premises of Messrs. E. and A. Garrould, drapers, in the Edgware-road, Mr. F. Swinford appeared for the Messrs. Garrould, Mr. Hutton for the Fireman George, Mr. F. Freke Palmer for Fireman Holloway, and Mr. Hyde for the Albo-Carbon Company.

Dr. A. Dupré said he was acquainted with the properties of albo-carbon. It was a coal-tar product, and consisted of carbon and hydrogen. It would melt at 174 degrees of heat, and boil at 400. There was no inflammable vapour produced until it was heated to 200 degrees, and it was free from spontaneous combustion, and was non-explosive. If a lighted match fell upon a mass of albo-carbon it would create fire of sufficient vigour to set ablaze any wood in the vicinity. Fire caused by albo-carbon could be easily extinguished at first.—By the Coroner: There was no more danger in keeping a quantity of albo-carbon than in keeping a stock of firewood steeped in resin, or of tallow candles. The vapour produced would kill anyone before he could be asphyxiated.

Mr. W. J. Dibdin, superintendent gas examiner to the Metropolitan Board of Works, stated that he was well acquainted with the properties of albo-carbon, which the gas people called naphthaline. This albo-carbon was necessary to produce the illumination in gas. The gas companies had great difficulty in keeping the albo-carbon in the gas during winter; and the Albo-Carbon Company supplied the material for placing it in the burner, so as to improve the illuminating power of the gas. When burning it gave out a dense black smoke. He had known the properties of the material for about ten years, and had never had an accident with it, nor did he see how it could have caused this fire. Gas companies could not supply the albo-carbon separately for their consumers, and that was why it was supplied by private firms.

The jury, after consulting together for nearly two hours, brought in the following verdict:—"That the deceased met their deaths by misadventure, through the fire at Messrs. Garrould's, which was caused by an act of carelessness on the part of Ellen Walker; that the firemen Holloway and George committed a gross dereliction of duty, and entirely failed to recognise the responsibilities of their position, that they deserved the severest censure, and were unworthy to remain members of the Metropolitan Fire Brigade." The jury further called the attention of the Metropolitan Board of Works to the want of facilities for escaping from a fire; and recommended that where albo-carbon was kept in a house it should be stored in an iron vessel. David Buchanan was finally praised for the bravery he displayed.

# Trade Notes.

WHO SENT THEM IN?—About two o'clock on Monday afternoon four men who had come from Warrington were engaged cleaning a sewer at Widnes which carries off the waste chemicals from most of the chemical works in the town, when three of them were overpowered by carbonic acid gas, and died before they could be rescued. The fourth man just managed to escape. Three doctors were on the spot in a short time, but their services were useless.

NITRATE RAILWAY COMPANY.—An interim dividend of £1. 5s. per share is payable on the 15th July.

BRYANT, POWIS, AND BRYANT LIMITED.—A dividend for the half-year ended March 31 is proposed at the rate of 5 per cent. per annum, making 5 per cent. for the year, carrying forward £2,359 and placing £2,500 to reserve account.

ENGLISH CROWN SPELTER COMPANY.—An interim dividend of 2½ per cent. is declared, making 5 per cent. for the year, £2,619 being carried forward to the next account.

THE PLAGUE VERSUS THE PLAGUE.—The nephew and assistant of M. Pasteur (M. Adrien Loir by name) has reached Sydney, and the report is that he is already at work spreading cholera among the rabbits with a view to their extermination. In a communication direct to his uncle, M. Loir expresses himself as without any doubt that he will make the plague kill the rabbits; but has he any doubt about his ability to prevent that plague from killing also the kangaroos, the dingoes, the bandicoots, the lambkins, and the cocks and hens.

South Durham Salt.—Last week four small cargoes of South Durham salt left the Tees—two evidently for use in British manufactures; one for Fisherrow, bespeaking use in the home fisheries, and one for use in the Norwegian fisheries. There is thus a growing for these deposits of salt for fish-curing, and there will be other fields of supply opened soon for the salt of South Durham. There are, however, bore-holes in the northern part of the district which are not yet at work, so that a further development of the trade is practicable.

Sale of Colliery Plant.—The plant of Chilton Colliery was put to the hammer by Mr. A. T. Crow, of Sunderland, recently. The reason for the dismantlement was not publicly stated. The attendance of buyers was very good, and the sale, under Mr. Crow, was most expeditiously carried out, and some good prices were realised. A locomotive engine, 16in. cylinders and 4ft. wheels, by Manning and Wardle, was bought by Mr. Johnson, of Wigan, for £555. A double horizontal winding engine, 26in. cylinders, by Joicey and Co. made £500. A compound differential pumping engine, with a low pressure cylinder of 54in. and a high-pressure one of 22in., by Hawthorne and Davey, realised £300. A Cornish pumping engine, in first-class order, with 90in. cylinders and 10ft. stroke, went for £700. A fan engine, 28in. cylinder, by Thwaites and Garbutt, made £250. A double vertical winding engine, 36in. cylinders, by Cooper, of Wigan, reached £1,500.

The Result of a Cold Collation.—The secretary of the London Electric Supply Corporation Limited writes that a failure in the supply of electric current on Sunday night last was due to a strike of stokers, who allowed their fires to run down, and then left their work without a moment's notice. He adds it may be interesting to the public to know that the men took offence that a gratuitous meal of roast beef, etc., was served to them cold instead of hot. We suppose the next strike will be for champagne and cigars.

The Parr Alkali Works.—The Bleach Association has now, it is stated, definitely acquired this property, and it is rumoured the same will be dismantled at an early date. This is the third works which has fallen in to the association, and we have it on very good authority that had the efforts of the syndicate to purchase the works for the sake of carrying it on been successful, the association would have dropped the price about 30 per cent. at one fell swoop.

Is Gold and Silver Crown Property?—Mr. Goschen, replying to a question last week in the House of Commons in reference to the Welsh gold mines, said the law officers advised that gold and silver found did not belong to the Crown, but that there was a royalty payable on them as on other metals, which would be susceptible as in other cases to variation according to value. No legislation was considered necessary to give legitimate encouragement to private enterprise.

New Invention in Glassmaking.—We understand that H. H. Pitt, of Buck Lane, Low Fell, Gateshead, has applied for letters patent for a new labour-saving machine to be used in the manufacture of all kinds of pressed glass ware. For this machine he claims to be able to turn out about four times the amount of work done by any other now in use, at about one-fifth the cost. The machine is so simple in construction that it will be almost impossible to get out of order, and can be regulated to suit any class of work now done by the old process.

Improvement in Trade.—In regard to the contract for gas coal of the Gas Light and Coke Co., of London, it is noticeable that it is for "one, two, or three years from the 1st July," and this is looked upon as an indication that the directors of that immense concern believe that the present is the time to contract ahead. If so, it is an indication that whilst they believe that low rates now prevail, higher prices may, in the course of some months, be known. We believe that the company takes its coals at a "delivered" price—a fact not without importance when the advancing rate of freights is remembered.

A Small Percentage.—How infinitesimal a change—chemical or physical—may be made to tell with striking effect in electrical manifestations is admirably illustrated by the experiment which Dr. Gore has been explaining to the Royal Society. In testing the effect of chlorine on the electromotive force of a small voltaic couple, Dr. Gore finds that one part in 17,000 million parts of water causes a sudden change of electromotive force. He adds—"As one part of chlorine in 17,612 million parts of water had no visible effect, and one in 17,000 millions had a distinct effect, the influence of the difference, or of one part in 500,000 millions, has been detected."

Magnetised Nickel.—The more you pull a wire the less becomes the magnetism that is in it, induced or residual. Sir William Thomson proved this, and, as regards nickel, his observation is confirmed and extended by the result of the interesting experiments which Mr. G. C. Cowan and Professor Ewing, of Dundee, have been conducting. The diminution of magnetism in nickel wire, caused by the longitudinal pull, is described as "surprisingly great." Seeing that magnetised wires of iron and nickel behave much in the same manner when stretched, how is it to be explained that when an iron bar is magnetised it becomes, like a cobalt bar, longer than it was before, whereas a nickel bar, like a steel bar, becomes shorter?

Russian Kerosene in China.—Under date of March 23, Consul Charles Seymour writes from Canton, China, to the Department of State as follows:—"During the month of January, 1888, a cargo of about 50,000 cases of Russian kerosene or refined petroleum arrived at and was sold in the port of Hong-Kong, and the greater portion of it has found its way into the province of Kwang-tung, and much of it has been sold to Chinese shopkeepers and native consumers at a price about equal to that of American kerosene. Some of it has been bought and is being consumed by foreign residents, as it is sold for a superior high test and safe oil. The cans are stamped thus—'The Batoum Naphtha and Trading Company,' with the red anchor and crescent marks. It is sold by reputable Hong-Kong foreign merchants to Canton buyers at $2. 25c. per case, containing two cans, each of which is the size of the American cans, holding about four imperial gallons, or five trade gallons, and as having a test of 130°, while ordinary American kerosene is sold as being safe at only 110°. Probably neither of the two oils (American or Russian) have been tested in China."—*Oil, Paint, and Drug Reporter.*

A Big Death Roll.—The Thursday's lecture on April 19, on "Public Health in India," was delivered at the Parkes Museum, by the Hon. Mr. Justice Cunningham, who spoke as the representative of an association which has for some years past made the public health in India its especial care. The lecturer stated that the annual death roll in India was probably nearer seven or eight millions than five, which was the official return for the year 1885. The following statement shows how largely the death rate is contributed to by diseases which we here recognise as preventable:—Total deaths in 1885: cholera, 385,928; smallpox, 80,630; fevers, 3,396,239; bowel complaints, 293,638; injuries, 83,262; other causes, 937,903; total, 5,177,600.

Agricultural Company of Mauritius Limited.—The report for the year ending March 31 states that there is an available balance of £8,317 as compared with £4,376 last year. The directors have carried to the credit of the reserve fund exchange account £4,512, raising that fund to £46,000, and now recommend a dividend of 1s. per share, making a dividend of 10 per cent. for the year, and leaving £1,305 to be carried forward.

Death in the Fruit Tin.—A note of danger to the public health, sounded in the *Lancet*, is well worthy of serious consideration. Tinned fruits we have, from certain personal experiences, always regarded with suspicion, and, touching the risks involved in consuming these dainties, Dr. Leonard W. Sedgwick makes a somewhat startling communication to our contemporary. Acting upon suspicions engendered by a poisoning case which came under his notice, Dr. Sedgwick recently tested tinned fruits in the shape of apricots, pine-apples, peaches, and tomatoes, with the result of finding a large amount of a salt of tin in the contents of each vessel. It is quite reasonable to conclude that the enclosure of an acid fruit for months in a tin pot will suffice to accomplish this most undesirable end, and the main question which it raises is whether the salts in question are noxious to the consumers of the fruit. The experience of Dr. Sedwick shows that an affirmative answer to the query may be given, and it is desirable that an extended investigation into this very important matter should be presently made. A simple remedy for all risks of the kind may, however, be at once pointed out, namely, the abolition of the cheap and familiar but dangerous tin in the preserving or carriage of fruit, and the substitution for it of vessels of glass or earthenware, such as those in which pickles and sauces are offered to the public. There can scarcely be any additional expense incurred in the change, and the contents of the bottle or jar must be absolutely free from metallic pollution.

# Correspondence.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## HERMITE'S BLEACHING PROCESS.

*To the Editor of the Chemical Trade Journal.*

Sir,—Referring to my letter in the Journal of 2nd inst., and to your editorial of 9th inst. (page 357 lines 13-15 and 10-11 from foot), will you permit me to point out that the experiments relating to "current efficiency" detailed in Messrs. Cross and Bevan's original paper were made with "a tank such as used in installations of the Hermite system on the large scale;" 845 litres of solution were used, and the total production of available chlorine was 3,528 grammes, or one-half that produced in the Belfast experiments described in their last paper. On the other hand, the figures recorded in the latter paper related to experiments performed with glass bell-jars, the total volume of solution used being less than 5 litres, and the yield of available chlorine only 1·085 grammes (say 1-28th of an ounce). Furthermore, the accuracy of their original small scale "bleaching efficiency" experiments are said in their later paper to be confirmed by large scale working.

From the foregoing it is apparent that the discrepancies pointed out in my previous letter cannot be explained away by saying that their earlier figures were the results of small laboratory experiments, and the later ones the records of larger scale working. The force of this will be seen when I state that, assuming the determinations of available chlorine in their original "current efficiency" experiments were correct—which experiments as I have said were on a scale only one-half smaller than the Belfast experiments—then an error in the determination of the current strength no greater than they made in their original experiments would entirely invalidate the conclusion supposed to be demonstrated by the Belfast experiment.

The figure 72·8 quoted in the fourth line from the bottom page 357 was not given by me—or rather by Messrs. Cross and Bevan—as the efficiency of the dynamo, but as the percentage of electrical units utilised (or said to be utilised) in doing useful work, that is to say in forming available chlorine.

With Messrs. Cross and Bevan, I am "quite content to await the results of a continuous trial of the process on a large scale," and meanwhile might I suggest that the reason why experiments to determine the bleaching power of the electrolised solution of magnesium chloride have not been undertaken by independent parties, may be attributed to the prevalent belief that the process received its *quietus* at the hands of Dr. Hurter twelve months ago.—Yours, etc.,

Newcastle-on-Tyne, 11th, June, 1888. W. M.

# Our Book Shelf.

NATURE'S HYGIENE: A Systematic Manual of Natural Hygiene. Third edition. By C. T. Kingzett, F.I.C., F.C.S., etc. 430 pp. London and Madrid: Ballière, Tindall, and Cox.

A LEGAL maxim tells us there is no wrong without a remedy, and the precedent for this assumption, no doubt, comes from nature itself. Whatever source of pollution is brought about by the aggregation of population, whatever excretions emanate from the animal during his struggle for existence, whether it be solid, liquid, or gaseous, nature has provided a remedy, and if we are not able to cope with any source of pollution, it points to the fact that our knowledge of nature's hygiene is an imperfect one, and the subject deserves more study than is usually given to it.

It is a well-known fact that plant life, whether terrestrial or subaqueous, plays an important part in the absorption of carbonic acid gas and the elimination of oxygen, and this fact, though so widely disseminated, is generally lost sight of by the dwellers in towns and manufacturing centres. Very little effort is made, comparatively speaking, towards arboriculture in our towns, and as to the growth of water weeds in our northern rivers, the idea has been passed over as a scheme too ridiculous for even casual notice.

Whoever has been to Norway to recruit his health will scarcely have forgotten the odour of the pine forests, clearly discernible ten miles from the coast, or the invigorating atmosphere which these exhalations have produced. Mr. Kingzett, in the work now before us, clearly explains how all this comes to pass, and the early portions of the book teem with experiments which he and other experimenters have undertaken. The whole work is intensely practical, and even the chapters on contagious diseases, epidemic or endemic diseases may be read by even the least scientific with ease and interest. Naturally, as Mr. Kingzett has identified himself now for so many years with the disinfecting properties of the oxidised principles of turpentine called "Sanitas," we expected to find a full account of the many virtues of this antiseptic and disinfecting liquid, and though we have not been disappointed we must admit that the subject has been treated of so skilfully and so unobtrusively, and in such a scientific spirit as to commend it to all sound thinking men, and will no doubt serve to introduce the substance in many quarters where ignorance has prevailed as to the scientific basis upon which its use rests.

We have read the work with much interest, and can confidently recommend it to our readers. It should tend to popularise the study of sanitation as a science; a science too much neglected at the present time, when people anxious to find a use for some new chemical compound, if it cannot be turned into any other channel, christen it a disinfectant and let it loose amongst a confiding public.

Mr Kingzett asks on page 207—What chemical means and agents, then, are to be employed for the prevention of such diseases? His answer deserves to reach and be remembered by every member of the human race. It is—"The general means include cleanliness; the studied exclusion of putrescible matters and processes in and near human dwellings; and a due provision of pure air and pure water. Every medical practitioner and every sanitarian, irrespective of theories as to the causation of preventable disease, is assured of the help which filth and insanitary surroundings give to contagious illnesses."

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY.

SULPHATE of ammonia has lost vigour since Tuesday last—not very much as judged by to-day's nominal quotation (£11. 10s. to £11. 12s. 6d.), but there has been hardly anything doing, for, although offered samples are rather scarce, on the other hand buyers are the reverse of eager. The general chemicals market is at least no worse, perhaps the turning to the better, but with prices as yet quite unmoved. The outlook for bleaching powder still continues moderately promising, and prices for local delivery are well held. Bichromates again move off very feebly only, and the week's total has been very low. In paraffin chemicals there is no improvement to report as yet, the demand for scale and wax continuing very weak, and the candle makers still holding aloof except to the extent of immediate needs. Oil (burning) is also at zero. It falls to the Mineral Oil Association about this time to fix the price of the article forward for another year, and this would probably have been done at the meeting of yesterday (Monday) had the general meeting of Young's Paraffin Company not been taking place at the same time, and thus hindering the necessary attendance of its representatives. General prices current are: Soda crystals, 42s. 6d. net Tyne; alum, in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £41 net Glagow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76°, £8. 5s.; 70/72°, £6. 12s. 6d.; 60/62°, £5. 15s., and cream, 60/62°, £5. 13s. 9d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £4. 15s., and 1 cwt. casks, £5. 5s. net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 20s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 4½d.; chlorate of potash, 5½d., less 5 % any port; sulphate of ammonia, £11. 10s. to £11. 12s. 6d. f.o.b. Leith; sulphate of copper, £20s. 10s.; paraffin scale, hard, 2 1/16d., soft, 2d.; paraffin wax, 120° semi-refined, 2 1/16d.; paraffin spirit, 4½d.; paraffin oil (burning), 5⅝d. to 6d., and

lubricating ditto, 865°, £4. 10s. to £4. 15s.; 885°, £6; and 890/95°, £7. 10s. to £7. 15s. Sugar imports to Greenock for the week were 39,359 packages, including bags and baskets.

## THE LIVERPOOL MINERAL MARKET.

Minerals during the last week have ruled firm. Manganese continues steady, without alteration. Magnesite (containing 98 per cent. of carbonate of magnesia), unaltered at 30s. to 35s. for raw lump; raw ground, £6. 10s., and calcined ground, £10 to £11. Bauxite (Irish Hill brand) continues very brisk at full prices; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk sells freely, bringing full prices, especially best brands—90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) in good demand. Selected crystal lump scarce at £6. 5s.; No. 1 lumps, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone quiet, but selling at the advanced prices—ground, at £8; specially selected lump, finest quality, £11. 10s. Iron ore continues steady; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s.; Cumberland, 8s. to 12s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone continues in more demand, especially for best brands—£5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore continues firm at last quotations. Antimony ore continues firm; £16 to £22 for fair quality. Antimony metal unchanged. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15; Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine, quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; Italian and Bohemian, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 per cent. packed, £11. 2s. 6d.; 70 per cent. packed, £10; 60 per cent. packed, £8. 16s.; 50 per cent. unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. Spiegel, 20 per cent., £4. 12s. 6d. Silicon spiegel, 9 per cent., £8. Chrome pig, 10 per cent., £8. 10s. to £10. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50.

## LIVERPOOL CHEMICAL MARKET.

A fair amount of business has been done, and there is practically no alteration to report in prices. Soda-ash 1d. up. Caustic soda: 60 % white, £5. 17s. 6d.; 60 % cream, £5. 15s.; 70 % white, £6. 17s. 6d.; 74 %, £7. 10s.; 76 %, £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda, 9s. 6d. to 9s. 9d. Soda crystals, £2. 15s. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 12s. 6d. for hardwood, and £7. 10s. softwood. Saltcake, 22s. Bichromate of potash, 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £18 to £20. Chlorate of potash, 5¾d. to 6d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. 5s. to £12. 10s., strong. Lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper quoted at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24s. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia, white, 22s. Refined borax unaltered. Verdigris 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 24s. Pearl ashes, £2. 3s. Chloride of zinc (solid), £18.

## THE LIVERPOOL COLOUR MARKET.

Colours unchanged. Ochres: Oxfordshire is quoted £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s. to 60s.; M.C., 65s. to 67s 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

Business continues dull and prices have been without any variation of consequence during the past week. Soda-ash and caustic soda are unchanged and orders keep pretty well on a par with the output. Bleaching powder has shown slight signs of recovery in price, and manufacturers are well engaged with orders. Chlorate of potash continues at 5½d. and is quiet. Copper and copper sulphate are without any material change. Tin crystals are weak. Lead acetate is more freely offered, and price of foreign has given way; English makes are also weaker. Borax has declined, and refined qualities can be bought for 29s. to 30s., according to brand. Muriate of ammonia continues scarce, and prices are firm. Other ammonia salts are without change. Carbonate and caustic potash keep firm in prices. In acetates of lime, brown and grey, there has been more business passing, but stocks prevent recovery of prices meantime. Acetic acids are still at unremunerative prices. Prussiate of potash at 6⅜d. and bichromate of soda at 3½d. are dull.

## METAL MARKET REPORT.

The event long anticipated, the death of the German Emperor, has been the incident of the week, causing Bourses to be closed and markets to be interrupted. Now that the new reign has begun, Europe has favourably interpreted the proclamation of the young Emperor to his army, his navy, and his people, and the threatening clouds that were thought to portend war are clearing, and there is at the moment a far more hopeful feeling and a more sanguine expectation that the Empire may mean peace. The metal markets have been stagnant, but steady. Copper is a few shillings easier, both for cash and three months, than a week ago, the prices being £82. 2s. 6d. and £78. 7s. 6d. Tin is easier, the prices having receded from £80. 10s. to £79. 12s 6d. cash, and from £81. 5s. to £80. 2s. 6d. for three months. Iron is firmer, closing at 38s. Spelter and lead a little easier. Silver unchanged at 42 1/16d.

## THE SULPHATE OF AMMONIA MARKET.

The sulphate market is quiet, and at present the dealers are not buying, so that there is no temptation to do business unless the price is lowered to allow of a little speculation. Fortunately stocks are low and even what there are, have been in some cases sold for July delivery, so there is but little need to be anxious. Hull price ranges from £11. 11s. 3d. to £11. 12s. 6d., but buyers are doing their best to secure parcels at lower rates. Beckton asks £11. 15s. 0d., while outside London makes are fetching from £11. 12s. 6d. to £11. 13s. 9d. At Leith the market is firm, though endeavours have been made to weaken it, and £11. 10s. 0d. may be taken as the closing price. Continental makers seem well satisfied with the situation, which is reported as "healthy."

## THE TAR PRODUCTS MARKET.

The tar products market is in many instances in a most unsatisfactory state, and it is only in one or two products that business can be called satisfactory. With benzols, prices can only be called nominal as selling and buying values are

so distinct. We should think 90's at 2s. 4d. and 50/90's at 2s. 3d. might be obtained, but if a small maker was anxious to sell he would be offered less than these prices Carbolic acid (crude) has a lower tendency, and anthracene is less satisfactory than it was, owing to an absence of buyers. Solvent naphtha has been in fair demand at about 1s. 0½d. per gallon, but it is not certain what the sudden influx of another material may do for this market. Pitch still maintains its ground, and we hear that 17s. has been refused at Garston, the holders believing it may touch 20s. before a fall comes. We hope it may.

# New Companies.

Automatic Electrical Corporation Limited.—This company was registered on the 7th inst., with a capital of £75,000 in £20 shares, to act as undertakers for the supply of electricity for lighting and other purposes, within the United Kingdom and elsewhere. The subscribers are:—

| | Shares. |
|---|---|
| E. J. Hermandez, 7, Liverpool-street | 1 |
| T. G. Kostzentein, 27, Phillimore-place, Kensington, secretary | 1 |
| T. G. Blanchard, 25, Huntley-st., Tottenham-court road, accountant | 1 |
| D. Doherty, 6, Great Newport-street, W.C., printer | 1 |
| E. Guitton, C.E., 8, Canning-place, W. | 1 |
| R. G. Upton, Mitcham | 1 |
| W. Sherratt, 461, Oxford-street | 1 |

C. H. Reynolds and Company Limited.—This is the conversion to a company of the business of cask, barrel, box, packing case, and crate manufacturer, firewood and timber merchant, and sawyer, carried on by Charles Hy. Reynolds, at Lowestoft, Suffolk. It was registered on the 6th inst., with a capital of £5,000 in £1 shares. The subscribers are:—

| | Shares. |
|---|---|
| C. H. Reynolds, Thurleston-road, West Norwood | 1 |
| F. W. Fox, Uplands Samerton, Plymouth | 1 |
| W. E. Breakspear, 13, Philip-lane, Tottenham, accountant | 1 |
| J. F. Spriggs, 1, De Crespigny-terrace, Denmark-hill, advertising agent | 1 |
| G. A. Harvey, 12, Daleview-road, Stamford-hill, clerk | 1 |
| F. Barrett, Heathfield-road, Croydon, clerk | 1 |
| J. Lemay, 161, Queen's-road, Dalston, clerk | 1 |

Denaeyer's Peptones Company Limited.—This company proposes to adopt an agreement of the 9th inst., for the purchase of the sole right to manufacture pure peptones of meat, and all chemical combinations from peptones, especially peptonate of iron, and its official preparations, such as wines, elixirs, etc., according to the system known as "Denaeyers." It was registered on the 11 inst., with a capital of £10,000 in £10 shares. The purchase consideration is 993 shares (fully paid-up), 600 debentures of £10 each, forming part of an issue of £40,000 in debentures, and £2,000 cash. The subscribers are:—

| | Shares. |
|---|---|
| F. H. Lenders, 118, Bishopgate-street Within, merchant | 1 |
| C. Van Gael, 147, Chaussee de Haecht, Brussels | 1 |
| C. Fryer, 76, Rotherfield-street, Islington | 1 |
| W. H. M. Maclean, Kingslyn, Upper Norwood | 1 |
| O. Bulda, Hill Holme, Forest-hill | 1 |
| A. J. Eleeling, Cresswell Lodge, Chiswick | 1 |
| F. P. Leon, Woodlands, Clapham Park | 1 |

Gem Glass Company Limited.—This company was registered on the 8th inst., with a capital of £10,000 in £20 shares, to carry on the business of glass works in all branches. Certain letters patent and inventions will be purchased by the company upon terms of an unregistered agreement of the 6th inst., between Edward Smith, Fredk. Smith, and Henry Rowe of the one part, and D. H. Pettitt of the other part. The subscribers are:—

| | Shares. |
|---|---|
| A. C. Lyster, Abbey Wood, Kent, director Civil Service Co-operative Society | 1 |
| C. W. Heaton, Belvedere, professor of chemistry | 1 |
| Ernest Honey, Sidcup | 1 |
| W. Miskin, Sidcup, sub-manager of fibre works, Dartford | 1 |
| H. J. Gardiner, Eltham, merchant | 1 |
| A. O. Miles, 28, King-street, Cheapside, chartered accountant | 1 |
| T. P. Child, 42, Poultry, chartered accountant | 1 |

International Breweries Company Limited.—This company was registered on the 12th inst., with a capital of £60,000 in £5 shares, to acquire breweries in France or elsewhere, and to trade as brewers, distillers, wine, spirit, and mineral water merchants. The subscribers are:—

| | Shares. |
|---|---|
| A. S. Farr, Slade House, Kennington-road, insurance agent | 1 |
| A. Warner, 7, Dunster-gardens, Brondesbury | 1 |
| S. Chiesman, 60, Gracechurch-street, merchant | 1 |
| R. S. Wright, 159, New Bond-street, accountant | 1 |
| A. H. Kelday, Leacroft, Sydenham, accountant | 1 |
| A. W. Sinclair, 65, Southwark-street, merchant | 1 |
| E. Coste, Gravesend, distiller | 1 |

Manchester Chamber of Commerce.—This association was registered on the 5th inst. as a company limited by guarantee to £2 each member; the word limited being omitted from the title in pursuance of section 23 of the Companies Act, 1867. It proposes to promote and protect the Home, Colonial, and Foreign trade and commerce of the United Kingdom, and in particular the trade, commerce, and manufactures of Manchester, Salford, and the surrounding district. The subscribers are:—

G. H. Gaddum, 7, South-street, Manchester, merchant.
G. Lord, 101, Princess-street, Manchester, merchant.
B. Armitage, 48, Mosley-street, Manchester, cotton spinner.
R. Barclay, 1, Dickinson-street, Manchester, merchant.
B. Carver, 7, Lower Mosley-street, Manchester, merchant.
W. W. Clapham, 35, Church-street, Manchester, merchant.
E. Helm, 13, Nicholas-street, Manchester, cotton spinner.

Mr. John Fox Turner is appointed first secretary.

Petroleum Engine Company of America Limited.—The registration of the company was effected on the 6th inst., the nominal capital being £150,000 in £5 shares. It proposes to acquire and work United States patents for petroleum engines, and for such purpose to adopt an agreement between J. J. Revely Humes and Ernest Whitehead. The subscribers are:—

| | Shares. |
|---|---|
| T. T. Curtis, 17, Triangle, Ruby-street, Old Kent-road, cashier | 1 |
| G. F. Adams, 152, Fanbridge-road, N., clerk | 1 |
| H. F. Adams, 126, Bayham-road, N.W., clerk | 1 |
| W. Micklethwait, 34, Millman-street, Bedford-row | 1 |
| C. Chilcott, 39, Frederick-street, Caledonian-road, schoolmaster | 1 |
| G. F. Tuker, 30, Kerrett-road, Brixton, stationer | 1 |
| E. Whitehead, 73A, Queen Victoria-street, clerk | 1 |

Phosphate Mining Company Limited.—This is a reconstruction of the Phosphate Mining Company Limited (in liquidation). It was registered on the 9th inst., with a capital of £100,000 in £20 shares. The subscribers are:—

| | Shares. |
|---|---|
| Charles Thomas, J.P., Broad Plain, Bristol | 1 |
| T. Davey, 12, Welch Back, Bristol, tobacco manufacturer | 1 |
| G. W. Lucas, Carlton-chambers, Bristol, stockbroker | 1 |
| A. J. Alexander, 7, Small-street, Bristol, general manager of Bristol Water Co. | 1 |
| W. H. Stevens, Clifton, Bristol | 1 |
| J. Wethered, Clifton, Bristol, colliery proprietor | 1 |
| W. Smith, 38, Corn-street, Bristol, merchant | 1 |

Suter Hartmann and Rahtjen's Composition Company Limited. This company was registered on the 12th inst., with a capital of £140,000 in £10 shares, to take over the businesses of Suter Hartmann and Company, of London, Hartmann Brothers, of Canning Town, Essex; Hartmann, De Doux and Company, of Liverpool, Hartmann, Newman and Company, of Glasgow and Newcastle-on-Tyne; and also the business of John Rahtjen, of Germany. The business to be carried on by the company is the manufacture of paints, compositions, compounds, and varnishes, and as manufacturing chemists and druggists. The subscribers are:—

| | Shares. |
|---|---|
| H. W. Payne, 24, Cornhill, solicitor | 1 |
| William Hartmann, 18, Billiter-street, merchant | 1 |
| A. Hartmann, 18, Billiter-street, merchant | 1 |
| R. le Doux, 12, Rumford-place, Liverpool, merchant | 1 |
| G. Hartmann, 18, Billiter-street, merchant | 1 |
| J. Rahtjen, 18, Billiter-street, manufacturer | 1 |
| H. Rahtjen, 18, Billiter-street, manufacturer | 1 |

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

Pollard & Brown, Hanley, wholesale drysalters, as far as regards B. Pollard.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Bentote, J. (trading as J. Mechi & Co.), Mark-lane, City, patent manure merchant.
Burr, Francis Harry, Gloucester, colourman.
Dormer, Richard, Garston, near Liverpool, analytical chemist.
Robinson, James, Greenfield, Yorkshire, finisher and bleacher.

### Adjudications.

Burr, Francis Harry, Gloucester, colourman.
Hammond, Joseph, Woollaston, Stourbridge, and Tividale, near Tipton, glass manufacturer.
Haslip, James Frederick, New Southgate, Middlesex, oil and colourman.
Packer, Henry James, Reading, oilman.
Robinson, James, Greenfield, Yorkshire, finisher and bleacher.
Selby, William Sisson, High-street and Douglas-street, Deptford, Brockley-road, Brockley, and Church-street, Lee, Kent, oil and colourman.

### First Meetings and Public Examinations.

Sharp, Henry, London-place, London-fields, Hackney, bottle manufacturer. June 27, 33, Carey-street, Lincoln's-inn; July 10, 34, Lincoln's-inn-fields.
Hammond, Joseph, Woollaston, Stourbridge, and Tividale, Tipton, Staffordshire, glass manufacturer. June 26, Official Receiver's office, Dudley; June 26, Court-house, Dudley.
Burr, Francis Harry, Gloucester, colourman. June 26, Bell Hotel, Gloucester; July 18, Shire-hall, Gloucester.

### Notices of Dividends.

Bray, Edmond Selwyn, Smart's-buildings, Holborn, mineral water manufacturer. Final dividend of 1s. 0½d., July 2, Messrs. Martin and Farlow's, 4, King-street, Cheapside, E.C.

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels:—*

Applications for Letters Patent.

**Ventilating Apparatus.**—(Complete Specification.) J. McConachy. 8385. June 8.
**Testing the Human Eye.** W. Gibbons. 8397. June 8.
**Hydraulic Presses for Mining.** T. C. Roberts-Horsfield and R. Porter. 8400. June 8.
**Electric Batteries.** E. W. Clifton and V. Robinson. 8401. June 8.
**Combined Measure and Funnel.** R. C. Tapping. 8402. June 8.
**Improved Process for Purifying Metals.** L. A. Groth. 8410. June 8.
**Photographic Films.** S. H. Fry. 8413. June 8.
**Blasting Cartridges.** L. Plom. 8426. June 8.
**Extraction of Precious Metals from Ores.** J. E. Guild. 8427. June 8.
**Artificial Draught for Steam Boilers.** H. F. Green and E. J. Curtin. 8429. June 8.

**Waterproof Linen.** A. J. Boult. 8434. June 8.
**Steam Boilers.** R. Low. 8450. June 9.
**Rotary Cultivator.** G. E. Coleberd. 8454. June 9.
**Candles.** W. Usher. 8461. June 9.
**Hydro-compressed Air Power.** C. Barnett. 8466. June 9.
**Flexible Tubes for Fluids Under Pressure.** R. Gagné. 8479. June 9.
**Treating Town Refuse.** J. G. Galley. 8480. June 9.
**Reciprocating Sieves.** W. Stringer. 8486. June 9.
**Expelling Liquid from Sewage Sludge.** J. Price. 8491. June 9.
**Treating Candle Wicks.**—(Complete Specification.) De Stearine Kaarsen Fabrik "Apollo." 8492. June 9.
**Coating Metals with Zinc.** J. Lea and H. R. Hammond. 8496. June 9.
**Caulking the Seams of Steam Boilers.** W. Keen and R. H. N. Alleyne. 8501. June 9.
**Lamp for Magnesium Light.** W. Guttenberg. 8508. June 11.
**Treating Steel.** C. B. Burdon and J. Clark. 8511. June 11.
**Automatic Valve for Preventing Waste of Fluid.** S. J. Southon, C. W. Franklin, and W. Stone. 8512. June 11.
**Clarifying Beer.** A. G. Fericka and A. Eggiman. 8522. June 11.
**Water Gauges.** F. C. Lynde. 8524. June 11.
**Dyeing Fabrics Black.** T. Holliday. 8530. June 11.
**Manufacture of Lead Wire and Piping.** L. Baxendale, C. Darrah, and A. Turner. 8539. June 11.
**Joints for Metal Vessels.**—(Complete Specification.) W. H. Wheatley. 8545. June 11.
**Stone Crushers.** A. C. Nagel and A. Linnenbrügge. 8549. June 11.
**Purifying Water for Boilers.** E. Lechner. 8550. June 11.
**Retort Mouthpieces.** W. H. Westwood and E. T. Wright. 8551. June 11.
**Sifting, Bolting, and Sorting Meal.** C. Haggenmacher. 8558. June 11.
**Manufacture of Gas.** The Gas Patents Syndicate Ltd. 8559 June 11.
**Improvement in Fuel Gas Burners.** The Gas Patents Syndicate Ltd. 8560. June 11.
**Improvement in Kilns for Firing Bricks.** The Gas Patents Syndicate Ltd. 8561. June 11.
**Purifying and Heating Feed-Water.**—(Complete Specification.) D. Stark. 8568. June 11.
**Drying Wool and Fibrous Substances.** J. Bradshaw. 8576. June 11.
**An Improved Beverage.** T. Needham. 8585. June 12.
**Generating Sulphurous Gas for Disinfecting.** J. Hanson. 8597. June 12.
**Soap.** C. A. Stitt. 8604. June 12.
**Refrigerators.**—(Complete Specification.) Zimmerman Refrigerator Co. 8605. June 12.
**Hydrocarbon Motors.** E. Butler. 8620. June 12.
**Centrifugal Separators.**—(Complete Specification.) H. Petersen. 8624. June 12.
**Liquid Purification.**—(Complete Specification.) W. Oliphant. 8627. June 12.
**Feed-Water Heater and Filter.**—(Complete Specification.) W. Oliphant. 8628. June 12.
**Feed-Water Regulator.**—(Complete Specification.) O. Imray. 8633. June 12.
**Manufacture of Manures from Basic Slags.** The Lezant Syndicate Ltd. 8641. June 12.
**Coating Tin and Terne Plates.** R. Harris and W. Williams. 8658. June 13.
**Vessels for Measuring Liquids.** J. W. Jackson. 8662. June 13.
**Blasting Cartridges.** M. Settle. 8668. June 13.
**Wind Engines and Motors.** G. G. Picking and W. Hopkins. 8682. June 13.
**Drying Slurry for Cement.** C. Baker. 8693. June 13.
**Ventilating Apparatus.** W. P. Thompson. 8710. June 14.
**Mixing Substances for Briquettes.** T. C. Fawcett. 8715. June 14.
**Bricks.** M. C. Ashwin. 8723. June 14.
**Consuming Smoke.** W. Parker and R. Turner. 8725. June 14.
**Purifying Sewage.** J. H. Barry. 8728. June 14.
**Vegetable Black.** E. A. de Lisle. 8738. June 14.
**Soap.** W. H. Nevill. 8740. June 14.
**Utilising Peat Fibre.** G. A. Cannot. 8742. June 14.
**Plating Metals with Aluminium.** L. Q. Brin. 8746. June 14.
**Producing Aluminium, Bronze, and other Alloys.** L. Q. Brin. 8747. June 14.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending June 9th.*

**Acetic Acid—**
Holland, 65 cbys. Beresford & Co.
" 35 pkgs. "

**Acetate of Lead—**
Germany, 12 cks. Lister & Biggs

**Alkali** *(otherwise undescribed)*—
Montreal, 93 c. Charles & Fox
Holland, 220 c. Beresford & Co.

**Alum—**
France, 17 tcs. Middleton & Co.

**Brimstone—**
Italy, 5 t. F. Smith
" 1 F. Morgan
" 400 W. C. Bacon & Co.
" 4 C. J. Capes & Co.
" 6 "
" 53 Clift, Nicholson & Co.
" 10 H. S. Smith & Co.
" 40 C. H. Gray
" 13 G. Boor & Co.
France, 5 t. H. A. Litchfield & Sons

**Beetroot Ashes—**
France, 45 cks. F. W. Berk & Co.

**Barium Chloride—**
Germany, 12 cks. Petri Bros.

**Borax—**
Germany, 1 ck. Craven & Co.
Italy, 16 J. Puddy & Co.

**Barytes—**
Germany, 23 cks. O'Hara & Hoar
" 23 "
" 46 W. Harrison & Co.
Holland, 22 F. J. Allshorn
" 22 B. Winston & Sons
Belgium, 22 W. Harrison & Co.
" 43 "

**Bones—**
U. States, 11 t. A. & W. Nesbitt

**Caoutchouc—**
Zanzibar, 42 c. Kebbel, Son & Co.
" 90 A. Fisher
" 6 L. & S. K. D. Co.
Aden, 14 "
E.Indies, 223 Ralli Bros.
" 698 Kebbel, Son & Co.
" 52 Wrightson & Son
" 92 L. & S. K. D. Co.
" 120 J. H. & G. Scovell
U. States, 40 W. Balchin
France, 4 Flageollet & Co.
C. America, 12 c Stiebel Bros.
" 4 R. G. Hall & Co.
" 5 Kebbel, Son & Co.

**Ceresine—**
Germany, 68 bgs. Ross & Deering

**Copperas, White—**
Germany, 23 cks. Burgoyne, Burbidges & Co.

**Chemicals** *(otherwise undescribed)*
Germany, £65 T. H. Lee
" 15 E. & W. I. D. Co.
" 228 A.&M.Zimmermann
" 7 Craven & Co.
" 236 Phillipps & Graves
" 334 A.&M.Zimmermann
" 21 Domeier & Co.
" 149 A.&M.Zimmermann
" 334 "
S. Russia, 35 M. D. Co.

**Cream Tartar—**
France, 8cks. Webb,Warter&Co.
" 3 "
Spain, 12 "
" 4 F. Smith
Portugal,10 bgs. J. Turner & Co.
Italy, 52 cks. B. Jacob & Sons
" 43 W. Carter
" 9 Union Lighterage Co.
" 11 Fellows, Morton & Co.

**Dyestuffs—**
**Aniline**
Belgium, 18 cks. GirardBros.&Co.
Holland, 2 cs. Hooton & Yates
**Extracts**
Denmark, 2 cs. A. Selanders & Co.
U.States, 5 brls. L. J. Levinstein and Sons
" 150 bxs. Adamson&Ronaldson
" 111 Prs. Brook's Whrf.
France, 7 bls. T. Clark
Germany,20 cks. E. & W. I D. Co.
Canada, 400 brls. A. J. Humphery
Belgium, 4 cs. Skilbeck Bros.
**Tanners' Bark**
Adelaide, 22 t Devitt & Hett
" 105 "
" 55 J. Vicary & Sons
" 26 Barrow & Bros.
Germany, 19 Hicks, Nash & Co.
Sydney, 75 "
Belgium, 10 Baxter & Hoare
" 12½ "
Melb'rne, 20 "
" 49 N.Z.Loan & Mer.A.Co.

**Indigo**
E. Indies. 2 cs. E. & W. I. D. Co.
" 22 R. von Glehn & Sons
" 24 chts. L.&S.K.D.Co.
" 32 "
" 110 E. & W. I D. Co.
" 25 Wallace Bros.
" 65 Arbuthnot, Latham and Co.
" 32 Wrightson & Son
" 55 R.von Glehn & Sons
" 18 Phillipps & Graves
" 9 E. & W. I. D. Co.

**Indigo**—*continued*
Patagonia, 1 srn. Cotesworth and Powell

**Cochineal**
Canaries, 16 bgs. Bruce & White
" 2 J. Goddard & Co.
" 13 Marshall & French
" 5 Bruce & White
" 10 Swanston & Co.

**Shumac**
Italy, 25 bgs. N. Steinberg
" 1,100 J. Kitchin & Co.

**Argols**
Italy, 5 brls. M. Pinkerton
" 1,456 bgs. B. Jacob & Sons

**Myrabolams**
E. Indies, 2,900 bgs, Anderson, Weber & Smith
" 667 Baxter & Hoare
" 177 Humphery & Co.
" 2,049 R. G. Hall & Co.

**Orchella**
Azores, 4 bls. L. & S. K. D. Co.
" 4 bgs. Tingle, Jacobs & Co.

**Anthracene**
Belgium, 130 brls. Burt, Boulton&Co

**Cutch**
E. Indies, 100 bxs. Anderson, Fairley & Co.
" 194 Frith, Sands & Co.
" 4 Wrightson & Son

**Harria**
E. Indies, 4 bgs. E. & W. I. D. Co.

**Valonia**
A. Turkey, 15 c. J. Graves

**Dextrine—**
Germany, 50 bgs. Ross & Deering

**Glucose—**
Germany, 110 c. M. D. Co.
" 220 Rosenberg, Lowe and Co.
" 500 R.E.Drummond&Co.
" 250 Middleton,Son&Co.
" 120 C. Southwell
" 200 T. H. Lee
" 80 Pr.Chamberlain'sWf
" 160 "
" 200 "
" 411 H. Evans
" 200 P. W. Hore
" 300 J. Knill & Co.
" 63 UnionLighterageCo.
" 500 L. Sutro & Co.
" 240 Fellows,Morton&Co.
" 600 T. M. Duche & Sons
" 200 J. Barber & Co.
France, 200 H.A.Litchfield & Co.

**Gutta Percha—**
Berbice, 25 c. D. Baird & Co.
E. Indies, 420 J. H. & G. Scovell

**Isinglass—**
China, 29 pkgs. E. & W. I. D. Co.
" 4 Prs. Brook's Whrf.

**Isinglass**—*continued*
E.Indies, 13 pkgs. Clarke & Smith
" 4 cs. Grahams & Co.
" 6 pkgs. Arbuthnot, Latham & Co.
N. Russia, 2 G. H. C. Collier
Germany, 1 "

**Iron Oxide—**
Montreal, 6 cks. Dicketts, Petrie and Co.

**Manure—**
**Phosphate Rock**
Louvain, 200 t. Anglo Guano Wks.
Portugal, 253 G. S. N. Co.
Aruba, 332 G. M. Baner
**Bone Meal**
E.Indies, 8 t. E. & W. I. D. Co.
" 95 Bakewell, Bryden & Co.
**Salt**
Germany, 10½ t. E. & W. I. D. Co.
**Phosphate**
France, 10 t. J. Angus & Co.
**Manure** *(otherwise undescribed)*
Italy, 15 t. T. Farmer & Co.
**Phosphate Lime**
Belgium, 200 t. Leach & Co.
" 110 T. Turner & Co.
" 200 Leach & Co.
France, 100 Lawe's Manure Co.
**Gypsum**
Germany, 8 t. Howard & Sons
France, 30 J. Burnett & Sons
**Waste Compo**
U.States, 3½ t. C. A. & H. Nichols

**Naphtha**
Belgium, 6 brls. Stein Bros.
Germany, 10 dms. "

**Nitrate of Lead—**
Germany, 4 cks. A. Zumbeck & Co.

**Potassium Bicarbonate—**
Holland,10 cks. A.&M.Zimmermann

**Pitch—**
N.Russia, 350 brls. L.&N.W.Ry.Co.
France, 40 H. Hill & Sons
Belgium, 59 "

**Pyrites—**
Spain, 700 t. Anderson, Anderson & Co.
La Laja, 800 G. Ward & Sons
Pomaron, 760 Mason & Barry

**Pearl Ash—**
France, 45 c. F. W. Berk & Co.
" 240 Petri Bros.

**Potash—**
France, 120 c. Puty & Hendricks

**Potassium Sulphate—**
Germany, 12 cks. Beresford & Co.
Belgium, 195 bgs. J. Angus & Co.

**Paraffin Wax—**
U. States, 360 brls. H. Hill & Sons
" 300 J. H. Usmar & Co.
" 3,064 "

**Plumbago—**
Germany, 90 cs. E. Pink & Sons
" 9 cks. Fellows, Morton, and Co.
Holland, 1 Brown & Elmslie
**Peppermint Crystals—**
Japan, 17 cs. J. Batt & Co.
**Salicylic Acid—**
Germany, 1 cs. Burgoyne, Burbidges & Co.
**Saltpetre—**
Germany, 20 bgs. P. Hecker & Co.
**Sodium Borate—**
Germany, 4 cks. W. J. Crook
**Stearine—**
Belgium, 128 bgs. W. Balchin
France, 260 H. Hill & Sons
" 50 "
" 125 "
**Sodium Acetate—**
France, 100 c. Hunter, Waters & Co.
" 103 Pokorny, Fielder & Co.
" 10 cks. Lister & Biggs
**Salts Tartar—**
France, 2 cks. F. W. Berk & Co.
**Sugar of Lead—**
Germany, 17 cks. W. Caudery & Co.
**Sodium Sulphate—**
Holland, 115 cks. Petri Bros.
Germany, 4 E. von Rehn
**Tartaric Acid—**
Italy, 20 cks. Webb, Water & Co.
Belgium, 6 Union Lighterage Co.
Holland, 4 Northcott & Sons
" 43 Webb, Warter & Co.
" 6 Middleton & Co.
" 18 Webb, Warter & Co.
**Tar—**
France, 40 brls. Berlandina Bros.
**Tin Oxide—**
Germany, 7 cks. H. Lambert
**Ultramarine—**
Germany, 11 cs. G. Steinhoff
" 1 G. Meyer & Co.
" 10 6 cks. G. Steinhoff
Holland, 16 cks. A. Henry & Co.
" 4 Glaesser & Vogeler
" 20 Seaward Bros.
Belgium, 4 brls. Leach & Co.
" 4 "
**Verdigris—**
France, 1 ck. E. G. Hirch & Co.
**Zinc Oxide—**
U. States, 100 brls. M. Ashby
Germany, 257 "
" 1 ck. C. F. Gerhardt
" 10 cks. Burrell & Co.
Holland, 25 J. Parlevliet
" 250 T. Hubbuck & Son
" 50 brls. M. Ashby
Belgium, 10 Ross & Deering

## LIVERPOOL.

*Week ending June 13th.*

**Acetate of Lime—**
St. Nazaire, 80 sks.
**Bones—**
Constantinople, 158 bgs. Friandi Bros. & Co.
Santa Martha, 97 bgs. MacAndrews and Co.
**Borax—**
Calcutta, 123 bgs.
" 190 5 cans.
**Blood, Dried—**
Monte Video, 221 bgs. J. Purdon
**Cream Tartar—**
Barcelona, 5 cks. Sachse & Klemm
" 2
**Caoutchouc—**
Akassa, 4 cks. 5 brls. 9 cs. Royal, Niger & Co.
Accra, 5 brls Pickering & Berthoud
" 2 pns. 6 W. J. Rodatz & Co.
" 2 W. Duff & Co.
" 1 C. Lane & Co.
Winnebah, 6 bdls. F. & A. Swanzy
" 2 cks. J. P. Werner
Salt Pond, 1 pn. F. & A. Swanzy
" 4 brls. Pickering & Berthoud
" 2 cs. 6 W. Griffiths & Co.
C.C.Castle, 1 cs. 7 brls. Edwards Bros.
" 1 2 Pickering and Berthoud
" 1 2 C. L. Clare and Co.
" 2 4
" 4 brls. Tomlinson & Co.
" 1 Fletcher & Fraser

**Caoutchouc**—*continued*
C.C.Castle, 1 brl. Grimwade, Ridley and Co.
" 2 L. Hart & Co.
" 1 Bennett, Brotherton & Co.
" 1 Radcliffe & Durant
Elmina, 1 bx. 1 Fletcher & Fraser
Tabon, 1 bg. L. Hart & Co.
Monrovia, 1 cs. "
" 1 brl. C. J. Johnson
" 2
Sierra Leone, 46 brls. Pickering and Berthoud
" 42 cks. 26
" 1 hd. 9 pns. 5 cks. Paterson, Zochonis & Co.
" 7 cks. Pickering and Berthoud
Para, 19 cs. Bieber & Co.
" 5 A. Booth & Co.
Banana, 1 brl. British Congo Co.
Black Point, 7 cks. Pinto, Leite and Nephew
Loango, 4 cks. Edwards Bros.
Sette Cama, 8 "
N. Gove, 6 "
Fernan Vaz, 20 J. Holt
Elobey, 8 "
Cameroons, 1 brl. A. Herschell
" 2 cks. Rider, Son & Andrews
" 1 bg. D. Jones & Co.
Old Calabar, 1 ck. T. Harrison and Co.
" 2 B. & C. African Co. Ltd.
" 2 brls. 2 bgs. 1 cs. Pickering and Berthoud
" 5 15 cks. Taylor, Laughland & Co.
" 1 pn.
" 3 brls. Havard & Co.
" 2 Fletcher & Fraser
Akassa, 10 cs. 2 brls. 8 cks. Royal Niger Co.
Accra, 6 F. & A. Swanzy
" 2 C. Lane & Co.
Cape Coast, 1 C.L. Clare & Co.
Assinee, 2 cks. F. & A. Swanzy
" 1 bg. Pickering & Berthoud
Monrovia, 2 cks. Hutton & Co.
Sierra Leone, 5 brls. F. & A. Swanzy
" 1 1 hd.
Isles de Los, 70 bgs. M. Delaire
" 71 brls. F. Colin
Amsterdam, 72 bls.
**Copper Precipitate—**
Huelva, 120 t. Matheson & Co.
**Chemicals** *(otherwise undescribed)*
New York, 597 bgs.
Boston, 36 bxs.
Rotterdam, 16 cks.
**Collodion—**
Rotterdam, 4 tubs.
**Carbon—**
Philadelphia, 280 bgs. M. Ashley
**Charcoal—**
St. Nazaire, 455 sks.
**Creosote—**
New York, 2 brls.
**Dyestuffs—**
**Orchella**
Magdalena Bay, 6,869 bls. Wilson, Meyer & Co.
Lisbon, 146 bls. W. & R. Graham
St. Paul de Loando, 7 bgs. 6 bls. A. Redfern
Madeira, 50 bgs. A. Barbosa & Co.
Banana, 3 British Congo Co.
**Divi Divi**
Carthagena, 70 bgs. Ruete & Co.
Santa Martha, 25 D. Midgley and Sons
Savanilla, 451 Somes & Co.
Amsterdam, 770
**Indigo**
Akassa, 2 brls. Royal Niger Co.
Pram Pram, 1 ck.
**Myrabolams**
Bombay, 350 bgs.
**Madder**
Rotterdam, 4 cks.
**Saffron**
Valencia, 1 cs.
**Extracts**
New York, 10 brls.
Antwerp, 10
**Argols**
Bordeaux, 17 sks.
**Cutch**
Calcutta, 404 bxs. Turner & Co.
" 80
" 500
Rangoon, 10,168 E. Brownbill and Co.
" 300 bgs.

**Valonia**
Marathonisi, 117 t.
**Cochineal**
Grand Canary, 20 bgs. Beach & Co.
Teneriffe, 25 bgs. German Bank, London
**Glucose—**
Hamburg, 10 cks.
**Glycerine—**
Hamburg, 1 ck.
**Iodine—**
Valparaiso, 6 brls. A. Gibbs & Sons
" 14 Balfour, Williamson & Co.
**Isinglass—**
Para, 25 cs. Hooton & Yates
" 4 Pinto, Leite & Nephew
" 11 Gunston, Sons & Co.
**Potash—**
Montreal, 64 brls. Wilson, Paterson and Co.
Hamburg, 1,084 bgs.
**Pyrites—**
Huelva, 1,129 t. Matheson & Co.
" 1,637 "
" 1,449 Tennants & Co.
**Pitch—**
Rotterdam, 39 cks. J. R. Peace & Co.
**Saltpetre—**
Calcutta, 552 bgs.
" 1,150
" 1,388
**Sodium Nitrate—**
Iquique, 1,660 t W. & J. Lockett
**Stearine—**
Antwerp, 10 cs.
**Tartaric Acid—**
Rotterdam, 27 cks.
**Tartar—**
Bordeaux, 3 cks.
Naples, 5
**Ultramarine—**
Rotterdam, 4 cs. 6 cks.
**Verdigris—**
Bordeaux, 2 hds.
**Waste Salt—**
Hamburg, 120 t.
**Zinc Oxide—**
Rotterdam, 50 cks. O. & H. Marcus
Antwerp, 25 brls.
" 70

## GLASGOW.

*Week ending June 16th.*

**Biphosphate of Lime Solution—**
Marseilles, 52 cs. W. Valfride
**Chemicals** *(otherwise undescribed)*
Hamburg, 1 ck. 4 cs.
**Dyestuffs—**
**Extracts**
Antwerp, 3 cks. 2 cs.
**Madder**
Marseilles, 10 brls. Stewart & Murison
**Alizarine**
Rotterdam, 41 cks.
**Shumac**
Marseilles, 200 bgs.
**Glucose—**
Amsterdam, 13 cks.
**Guano—**
Gothenburg, 1,000 bgs.
**Manure—**
**Phosphate**
Montreal, 384 bgs.
**Phosphate of Lime**
Antwerp, 100 t.
**Waste Salt**
Hamburg, 100 t.
" 36 brls. 293 cks.
**Naphtha—**
Rotterdam, 4 cks. J. Rankine & Son
**Potash—**
Quebec, 7 brls.
**Sulphur—**
Oran, 250 brls. 5 bxs.
**Saltpetre—**
Hamburg, 100 kgs. 24 cks. J. Poynter & Son
**Tartaric Acid—**
Rotterdam, 5 cks. J. Rankine & Son
**Tartar—**
Oporto, 6 pkgs. Inglis & Wulff
**Zinc Oxide—**
Antwerp, 50 cks.

## HULL.

*Week ending June 14th.*

**Ammonia—**
Rotterdam, 13 cks.
**Albumen—**
Riga, 9 cks.
**Acetic Acid—**
Rotterdam, 10 pks. G. Lawson & Sons
**Chemicals** *(otherwise undescribed)*
Dunkirk, 91 pks. Wilson, Sons & Co.
Boston, 50 brls. "
Rotterdam, 3 cbys. Hutchinson & Son
Naples, 5 cks. Wilson, Sons & Co.
Danzig, 19 "
Hamburg, 1 cs. 76 pkgs. "
Dunkirk, 24 "
Antwerp, 14 pks. "
Rotterdam, 10 cks.
**Dyestuffs—**
**Alizarine**
Rotterdam, 32 cks. Hutchinson & Son
" 41 pkgs. J. Wilkinson & Son
" 21 cks. Hutchinson & Son
" 6 W. & C. L. Ringrose
" 11 Hutchinson & Son
**Shumac**
Rouen, 16 bgs. Rawson & Robinson
Trieste, 205 bgs. Wilson Sons, & Co.
Naples, 730 "
" 2,395
**Dyestuffs** *(otherwise undescribed)*
Boston, 90 bxs. Wilson, Sons & Co.
Trieste, 2 kgs. "
**Madder**
Naples, 2 cks.
**Argols**
Trieste, 133 cks. Wilson, Sons & Co.
**Glucose—**
Hamburg, 13 cks. C. M. Lofthouse and Co.
Stettin, 800 bgs. "
" 100
**Gelatine—**
Hamburg, 20 cs.
**Manganese—**
Rotterdam, 3 cks. G. Lawson & Sons
**Manure—**
**Kainit**
Hamburg, 230 bgs. C. M. Lofthouse and Co.
**Manure** *(otherwise undescribed)*
Stettin, 14 cks. 344 pkgs. Wilson, Sons & Co.
**Plumbago—**
Hamburg, 20 cks. Storry, Smithson, and Co.
**Saltpetre—**
Hamburg, 7 cks. Wilson, Sons & Co.
**Sodium Nitrate—**
Pisagua, 8,598 bgs.
**Sulphur—**
Naples, 1,436 bgs. 136 pkgs. 50 tons. Wilson, Sons & Co.
**Stearine—**
Hamburg, 30 cs. W. Jackson & Sons
Antwerp, 87 bgs. Wilson, Sons & Co.
**Salt—**
Hamburg, 200 bgs. Bailey & Leetham
**Turpentine—**
Konigsberg, 35 brls.
Libau, 30
**Tannic Acid—**
Rotterdam, 8 cks. Hutchinson & Son
**Tartaric Acid—**
Rotterdam 1 ck. Hutchinson & Son.
**Tar—**
Dunkirk, 2 cs. Wilson, Sons & Co.

## TYNE.

*Week ending June 16th.*

**Bleaching Powder—**
Hamburg, 1 ck.
**Chemicals** *(otherwise undescribed)*
Hamburg, 3 cs.
**Glucose—**
Hamburg, 105 bgs.
**Sulphur Ore—**
Caen, 30 t. Scott Bros.
**Salt—**
Hamburg, 100 t.
**Tartaric Acid—**
Rotterdam, 1 cs.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending June 11th.*

**Ammonia Carbonate—**
Amsterdam, 0 t. 12 c. £15
Bordeaux, 1 1 38
**Alum—**
Mogador, 2 t. 2 c. £12
**Ammonia Sulphate—**
Demerara, 40 t. 1 c. £460
Barbadoes, 45 19 586
Canaria, 15 bgs. 18
Hamburg, 50 0 590
St. Kitts, 17 3 204
**Acetic Acid—**
Buenos Ayres, 10 c. £10
**Ammonia—**
Demerara, 20 t. 5 c. £233
**Borax—**
Sydney, 0 t. 9 c. £11
Adelaide, 1 1 23
Fremantle, 1 0 20
**Bisulphite of Lime—**
Colombo, 20 kls. £26
**Blood, Dried—**
Canaria, 24 bgs. £12
**Citric Acid—**
Adelaide, 5 c. £45
Bordeaux, 10 84
Antwerp, 15 126
Brussels, 2 16
Rotterdam, 1 ck. 6 102
Havre, 12 99
Lisbon, 5 43
Genoa, 10 84
Algoa Bay, 5 44
New York, 10 86
Bremen, 10 86
Hamburg, 6 kgs. 4 cks. 265
Lisbon, 10 c. 84
**Caustic Soda—**
Archangel, 4 t. 2 c. £37
Auckland, 3 5 25
Constantinople, 4 cks. 15
Fremantle, 7 15 54
Sydney, 3 16 55
**Chemicals** *(otherwise undescribed)*
Valencia, 2 cs. £17
Melbourne, 50 kgs. 367
Algoa Bay, 6 cs. 36
Monte Video, 105
Natal, 1 t. 1 c. 10 cs. 82
Auckland, 7 cs. 20
**Copper Sulphate—**
Constantinople, 4 cks. £30
**Cream Tartar—**
Melbourne, 1 t. 10 c. £180
Rockhampton, 0 5 32
Adelaide, 0 10 62
Auckland, 0 13 85
Sydney, 2 0 278
Maryborough, 0 1 7
**Carbolic Acid—**
Algoa Bay, 20 dms. £18
Baltimore, 1 cs. 17
**Caustic Potash—**
Sydney, 11 c. £13
**Disinfectants—**
Calcutta, 200 cks. £93
Sydney, 8 cs. 87
Melbourne, 17 pkgs. 30
Brisbane, 19 21
**Guano—**
St. Kitts, 410 t. £4,100
**Iodide Potassium—**
Yokohama, 3 c. £157
**Manure—**
Barbadoes, 110 t £1,100
Malaga, 10 70
Auckland, 40 170
Motril, 455 4 c. 4,574
Riga, 10 50
Valencia, 829 6 7,400
Guadeloupe, 35 425
Ghent, 1,842 bgs. 570
St. Kitts, 8 85
Dominica, 35 350
Rouen, 390 140
**Oxalic Acid—**
Dunkirk, 5 t. 0 c. £160
Paris, 15 cks. 128
Wellington, 0 13 17
Antwerp, 3 0 100
**Potassium Chlorate—**
Melbourne, 8 c. £21
Oporto, 15 37
**Potassium Chlorate**—*continued.*
Sydney, 5 t. £260
New York, 10 c. 24
**Phosphorus—**
Adelaide, 5 c. £56
New York, 50 cs. 410
**Phosphorine—**
Demerara, 2 t. 19 c. £34
**Phosphate Rock—**
Ghent, 5 t. £15
**Soda Crystals—**
Rockhampton, 16 t. 5 c. £35
Melbourne, 3 5 10
Montreal, 2 cs. 22
Auckland, 11 13 36
**Sulphur, Flowers—**
Lisbon, 112 brls. £89
Melbourne, 61 pkgs. 130
**Sodium Silicate—**
Fremantle, 1 t. 10 c. £8
**Salammoniac—**
Constantinople, 2 t. 10 c. £80
Rotterdam, 12 30
Hamburg, 2 cks. 38
**Soda Ash—**
Oporto, 12 t. £58
**Superphosphate of Lime—**
Auckland, 75 t. £269
**Saltpetre—**
Rio Janeiro, 1 t. 7 c. £29
Alicante, 0 15 16
Bilbao, 4 19 99
Lisbon, 13 2 262
Adelaide, 6 15 146
Santos, 1 4 28
St. Michael's 6 brls. 15
Syra, 7 10 154
Launceston, 0 15 16
**Sheep Dip—**
Calcutta, 395 dms. £106
Natal, 300 50 cs. 133
Melbourne, 230 225
**Sheep Wash—**
Melbourne, 43 dms. £120
**Strontia Nitrate—**
New York, 19 c. £26
**Sulphuric Ether—**
Vigo, 1 cs. £30
**Salicylic Acid—**
Melbourne, 4 cs. £47
**Sulphuric Acid—**
Buenos Ayres, 2 t. 8 c. £24
Champion Bay, 3 31
**Sulphur—**
Sydney, 4 t. £26
**Soda—**
Gibraltar, 10 t. 1 c. £24
**Tartaric Acid—**
Auckland, 5 c. £45
Melbourne, 10 82
Adelaide, 15 122
Montreal, 1 t. 5 175
Calcutta, 3 cs. 24

## LIVERPOOL.

*Week ending June 13th.*

**Ammonia Carbonate—**
New York, 3 t. 18 c. 3 q. £147
Stockholm, 10 14
Odessa, 1 2 32
Rouen, 2 3 80
**Alum—**
Sundswall, 3 t. 5 c. £20
Beyrout, 1 4 6
Lisbon, 2 11 15
Kurrachee, 28 18 164
Bombay, 13 15 68
Syra, 1 7 7
**Acetic Acid—**
Lisbon, 7 c. 2 q. £6
**Arsenic Acid—**
New York, 16 t. 19 c. 2 q £161
**Alkali—**
Boston, 60 t. £305
,, 73 tcs.
**Acetate of Lime—**
Odessa, 51. 8c. 1q. £70
**Ammonia Muriate—**
Philadelphia, 22 t. 6 c. £525
Melbourne, 10 1 q. 13
Gefle, 1 11 2 38
**Ammonia Sulphate—**
Valencia, 69 t. 18 c. £804
**Bleaching Powder—**
Antwerp, 30 cks.
Baltimore, 122
Batoum, 18 tcs.
Bilbao, 27 brls.
Boston, 70 pps. 412 cks. 329 tcs.
Canada, 28 99
Genoa, 336 35 brls.
Gothenburg, 5
Lisbon, 10
Naples, 16
New York, 725 115 tcs. 10 bxs.
Philadelphia, 117 128 tcs. 90 pps.
Riga, 9
Rouen, 237
Trieste, 4
Venice, 20 brls.
Vera Cruz, 25
**Brimstone—**
Vera Cruz, 50 t. £237
Halifax, 10 1 c. 3 q. 44
**Barytes—**
Bombay, 1 t. 5 c. £6
**Boracic Acid—**
Genoa, 8 c. 2 q. £20
**Borax—**
Monte Video, 1 t. 15 c. £52
**Caustic Soda—**
Alexandria, 28 dms.
Almeria, 5
Amsterdam, 10 brls. 25
Antwerp. 14
Barcelona, 30
Bari, 143
Bilbao, 105
Bombay, 48
Boston, 300
Canada, 40
Chicago, 50
Dunedin, 80
East London, 4 cs.
Ferrol, 4 cks.
Gefle, 10
Genoa, 30
Gothenburg, 5
Hamburg, 10 cks. 37
Ibrail, 40
La Guayra, 30
Leghorn, 20
Marseilles, 50
Melbourne, 153
Monte Video, 160
Nantes, 18
Naples, 130
New York, 50 brls. 10 cs. 344 dms.
Odessa, 460 dms.
Oporto, 23
Palermo, 16
Panama, 1 cs.
Philadelphia, 200
Portland, 18
Riga, 785
Rotterdam, 36
Rouen, 18
St. John's, Nfld., 50 cks.
St. Petersburg, 95 kgs. 5
San Sebastian, 80
Seville, 25 cks. 198
Tampico, 100 kgs.
Talcahuano, 50
Venice, 24
Vigo, 2 cks.
Volo, 16
**Citric Acid—**
Valparaiso, 2 kgs. £5
Maranham, 1 c. 1 q. 11
Bilbao, 1 9
**Chemicals** *(otherwise undescribed)*
Alexandria, 1 t. £32
Genoa, 11 c. 2 q. 23
Dantzic, 1 11 2 47
Antwerp, 43 13 1,577
Montreal, 7 1 2 212
Sundswall, 1 44
Riga, 17 3 27
Rotterdam, 10 1 15
Cavis, 19 2 32
Merseyne, 3 6
Samsoun, 6 12
Bordeaux, 1 2 52
**Carbolic Powder—**
Hamburg, 2 t. 9 c. £370
Marseilles, 36 13 2 q. 3,768
New York, 4 406
**Carbolic Acid—**
Hamburg, 2 c. £14
Rotterdam, 5 t. 10 210
Rouen, 13 67
New York, 2 10 303
**Copperas—**
Samsoun, 4 t. 14 c. £10
Montreal, 10 2 3 q. 18
Constantinople, 7 13
Sundswall, 2 5
**Caustic Potash—**
New York, 3 t. 12 c. 1 q. £68
**Cobalt Oxide—**
Antwerp, 2 q. £8
**Carbon—**
Havre, 50 brls. £100
New York, 1 t. 12
**Charcoal—**
Hamburg, 18 t. 10 c. £70
**Copper Sulphate—**
Barcelona, 54 t. 5 c. 1 q. £1,065
Adelaide, 5 106
Montreal, 1 8 1 30
Bordeaux, 53 13 1,072
Sydney, 2 45
Rouen, 16 14 351
**Caustic Soda—**
New York, 11 t. 3 c. £111
**Carbon Bisulphide—**
Montreal, 5 c. £7
**Calcium Chloride—**
Rouen, 5t. 5 c. £10
**Disinfecting Fluid—**
Calcutta, 11 t. 13 c. £280
**Electric Carbons—**
Iquique, 3 cs. £94
**Iron Oxide—**
Montreal, 14 t. 10 c. £89
**Iodine—**
New York, 1 t. 1 c. 2 q. £1,300
**Magnesia—**
Carril, 3 cs.
Trieste, 1
Philadelphia, 28
Rio de Janeiro, 1 ck.
Santander, 2 cs.
**Manure—**
Barbadoes, 667 bgs. £550
Grand Canary, 15 t. 11 c. 71
**Oxalic Acid—**
Rio de Janeiro, 12 c. £20
Vera Cruz, 2 t. 17 3 q. 75
**Pitch—**
Callao, 20 brls.
Rouen, 100 t.
**Potassium Chlorate—**
Antwerp, 5 c. £13
Gothenburg, 5 t. 10 327
Genoa, 6 15
Naples, 3 5 165
Philadelphia, 10 525
New York, 33 1 2 q. 1,699
Shanghai, 1 10 92
Buenos Ayres, 1 10 80
Odessa, 15 41
Corunna, 10 25
Hamburg, 10 27
Rotterdam, 5 280
Passages, 1 60
**Phosphorus—**
Corinth 2 q. £3
Hong Kong, 2 c. 25
Vera Cruz, 7 2 60
**Potassium Sulphate—**
Amsterdam, 1 t. 2 c. 2 q. £10
**Pearl Ashes—**
Manaos, 2 c. 1 q. £8
**Potassium Bicarbonate—**
Leghorn, 5 t. 11 c. £130
**Potassium Carbonate—**
New York, 7 t. £119
**Potassium Bichromate—**
Passages, 4 c. £9
**Potash—**
Catania, 11 t. 15 c. £269
Palermo, 10 brls. 70
Brisbane, 1 2 1 q. 98
**Potassium Prussiate—**
Genoa, 4 c. 3 q. £6
**Salt—**
Adelaide, 10 t.
Algoa Bay, 4
Amsterdam, 566
Antwerp, 270
Archangel, 195
Banana, 50
Bona Vista, 100
Boston, 464
Brass, 200

**Salt**—*continued.*
Brisbane, 10 t.
Buenos Ayres, 370
Buguma, 22
Calcutta, 11,809
C.C. Castle, 16
Capetown, 235
Demerara, 60
Gefle, 616
Genoa, 258
Halifax, 717
Helsneborg, 140
Loango, 15
Manaos, 35
New York, 509
Philadelphia, 83
Port Natal, 50
Quebec, 1,000
Reykjavik, 164
Rosario, 9
San Francisco, 350
Souris, 271
St. John's, 122
Sydney, 185
Soderham, 248
Stockholm, 49
Talcahuano, 53
Vardo, 380
Warberg, 210
Wellington, 50

**Soda Ash**—
Alexandria, 2 cks.
Boston, 30
Baltimore, 36 tcs. 314
Barcelona, 50 brls.
Constantinople, 50
Boca, 100
Boston, 83
Genoa, 35 11
Buenos Ayres, 100
Calcutta, 23
Canada, 30 172 tcs.
East London, 20 kgs.
Maranham, 10
Melbourne, 12 brls.
Naples, 32
New York, 328 tcs. 66 cs. 388
Odessa, 10 brls. 34
Oporto, 50
Philadelphia, 862 tcs. 183
Rio de Janeiro, 50 brls.
Seville, 6
Smyrna, 250
Sydney, 366
Syra, 50
Ghent, 42

**Soda Crystals**—
Boston, 420 brls.
Constantinople, 50
Halifax, 50 cks. 20 kgs.
Montreal, 50
Odessa, 50
Philadelphia, 288 500
Port Natal, 10
St. John's, Nfld. 300
St. John, 25
Singapore, 10

**Sodium Silicate**—
Adelaide, 20 cks.
Alexandria, 4 brls.
Barcelona, 50
Bilbao, 35 16
Genoa, 34
Malaga, 6
Odessa, 111
Oporto, 24
Salonica, 7
Seville, 50
Smyrna, 10

**Sodium Bicarbonate**—
Alexandria, 40 kgs.
Almeria, 10
Bilbao, 37 brls. 100
Antwerp, 16
Calcutta, 250
Genoa, 11 cks. 113 dms. 80 pkgs.
Canada, 840 kgs.
Dunedin, 45
Hamburg, 179 brls. 50
Halifax, 135
Maranham, 70
Monte Video, 40 25
New York 267 bxs.
Rotterdam, 61 brls. 30
Odessa, 110 100
Philadelphia, 100
St. Petersburg, 120
San Francisco, 200
Sydney, 23 cks. 360
Yokohama 1,000

**Sodium Biborate**—
Antwerp, 139 brls.

**Sodium Biarseniate**—
Lisbon, 2 cks.

**Sodium Carbonate**—
Boston, 112 brls.

**Sodium Sulphite**—
Wellington 2 t. 6 c. 1 q. £16

**Sodium Nitrate**—
Melbourne, 9 c. 3 q. £5

**Salammoniac**—
Patras, 7 c. 1 q. £15
Corfu, 5 2 9
Montreal, 14 3 24
Alexandretta, 10 1 16
Syra, 6 10
Smyrna, 1 t. 1 34
Philadelphia, 4 10 144
Galatz, 5 3 10

**Sulphuric Acid**—
Capetown, 1 t. 10 c. £16

**Sulphur**—
Para, 4 c. £2
Montreal, 10 4
Dunedin, 1 t. 9

**Saltpetre**—
Para, 1 t. £24
Bilbao, 2 42
Loando, 1 3 c. 2 q. 25
Montreal, 12 2 13
Dunedin, 1 22
Syra, 3 15 81
Havana, 6 7

**Saltcake**—
Baltimore, 50 t. 2 c. £88

**Sheep Wash**—
Quebec, 1 t. 3 c. £75

**Sulphur Ore**—
Shanghai, 60 t. £150

**Sodium Stannate**—
Rouen, 5 cks.

**Tartaric Acid**—
Valparaiso, 3 kgs. £5

**Turpentine**—
Singapore, 50 dms. £33

**Tar**—
Sierra Leone, 20 brls.

**Zinc Oxide**—
Rouen, 1 t. 1 c. £16

**Zinc Chloride**—
Rotterdam, 5 t. 8 c. £36

## GLASGOW.

*Week ending June 16th.*

**Ammonia Liquor**—
Calcutta, 8 t. 12 c. £214

**Ammonia Sulphate**—
Marseilles, 170 t. 9 c. 2 q. £2,060

**Benzol**—
Rotterdam, 17 dms. £460

**Creosote Oil**—
Christiania, 2 brls. 14s.

**Epsom Salts**—
Quebec, 14 t. £31
Bombay, 23 11 c. 3 q. 128

**Ferro-silicon**—
Quebec, 48 t. 192

**Gelatine**—
New York, 17 c. £367

**Iodine**—
Rotterdam, 1 ck. £260

**Litharge**—
Quebec, 1 t. 4 c. £20

**Paraffin Wax**—
Gothenburg, 18 t. 13 c. £242

**Pitch**—
Caen, 351 t. 4 c. £230

**Potassium Bichromate**—
Rotterdam, 16 cks. £231
Bombay, 2 t. 2 c. 84
Christiania, 3 cks. 63

**Potassium Carbonate**—
Bombay, 3 t. 17 c. £62

**Plumbago**—
Bombay, 16 c. £37

**Sulphuric Acid**—
Rangoon, 16 t. 0 c. 2 q. £160
Bombay, 16 10 98

**Sugar of Lead (Brown)**—
Quebec, 1 t. 6 c. £26
Bombay, 3 2 1 q. 60

**Sodium Bichromate**—
Rotterdam, 37 cks. £280
Bombay, 14 c. 1 q. 22

**Slag, unground**—
Hamburg, 5 t.

**Sulphuric Ether**—
Quebec, 20 gins. £3

**Salt**—
Brisbane, 200 t. £128

**Tar**—
Hamburg, 4 t. 18 c. 2 q. £6
Gothenburg, 150 brls. 55

## HULL.

*Week ending June 12th.*

**Alkali**—
Bergen, 10 cks.

**Ammonia Sulphate**—
Hamburg, 20 t.

**Bleaching Powder**—
Drontheim, 31 cks.

**Chemicals** (*otherwise undescribed*)
Antwerp, 1 cs.
Amsterdam, 2 82 cks.
Bergen, 15 pkgs. 12
Bremen, 2 cs.
Copenhagen, 4
Christiania, 8 64
Dunkirk, 4
Drontheim, 12 pkgs. 20
Gothenburg, 341 slabs.
Genoa, 18 cs. 10 pkgs.
Ghent, 10
Helsingfors, 8 cks.
Hamburg, 291 cs. 46 cks 10 pkgs.
Konigsberg, 50
Libau, 23
Lulea, 12 1 2
Marseilles, 196
Naples, 10
Riga, 50
Rotterdam, 12 2 40
Rouen, 25
Stettin, 53 154

**Caustic Soda**—
Dunkirk, 19 dms.
Helsingfors, 2
Hamburg, 15
Libau, 36
Marseilles, 50

**Dyestuffs**—
Alexandria, 30 bgs.
Bergen, 2 cks.
Copenhagen, 4
Hamburg, 7 1 kg.
Rotterdam, 2
Reval, 28
Stettin, 370 bgs.

**Manure**—
Antwerp, 261 bgs.
Dunkirk, 500
Hamburg, 435

**Pitch**—
Antwerp, 400 t.

**Salt**—
Copenhagen, 5 t.

**Stearine**—
Copenhagen, 6 cks.

**Tar**—
Abo, 5 cks.
Hamburg, 16

## TYNE.

*Week ending June 16th.*

**Arsenic**—
Genoa, 2 t. 13 c.

**Alkali**—
Genoa, 8 t. 6 c.
Hamburg, 5 11
St. Petersburg, 26 16
Antwerp, 8 17
Rotterdam, 8 3
Gothenburg, 7 15
Reval, 78 12
Stockholm, 1 16
Riga, 18 11
Bergen, 1 4

**Antimony**—
Genoa, 10 c.
New York, 60 t.

**Antichlor**—
Odense, 1 t. 2 c.

**Alum**—
Rouen, 2 c.
Antwerp, 8
Rotterdam, 10 t. 5
Christiania, 10 1

**Ammonia Sulphate**—
Antwerp, 81 t.

**Bleaching Powder**—
Passages, 30 t. 3 c.
Lisbon, 5 7
Malmo, 13
Antwerp, 114 6
Hamburg, 22 17
St. Petersburg, 188 15
Rotterdam, 32 18
New York, 149 18
Riga, 68 11
Christiania, 25 8
Copenhagen, 11
Stockholm, 16 4
Gothenburg, 21 10

**Barytes**—
Genoa, 10 t. 3 c.
Rouen, 74 11
Antwerp, 10

**Creosote Oil**—
Seville, 211 t. 16 c.

**Caustic Soda**—
Passages, 3 t. 19 c.
Rouen, 4 19
Antwerp, 2 10
St. Petersburg, 21 13
New York, 174 14
Helsingfors, 3 2
Riga, 15
Bilbao, 15
Copenhagen, 2 6
Libau, 30 3
Gothenburg, 31 3

**Flint, Ground**—
Hamburg, 101 t.

**Gypsum**—
New York, 35 t. 9 c.

**Litharge**—
Leghorn, 1 t. 8 c.
Rouen, 1 3
Genoa, 1 3
Antwerp, 1 5
Hamburg, 3
Lisbon, 18
Gothenburg, 1 16
Stockholm, 1 3

**Magnesia**—
Genoa, 10 c.
Rouen, 4
Antwerp, 1
Riga, 4

**Manure**—
Lisbon, 1 t. 10 c.
Reval, 100 2

**Manganese**—
Bilbao, 53 t. 6 c.

**Potassium Chlorate**—
Naples, 4 t. 12 c.
Antwerp, 8
New York, 1 4
Riga, 2

**Pitch**—
Lisbon, 50 t.

**Soda**—
New York, 212 t. 10 c.
Genoa, 71 16
Naples, 3 4
Sundswall, 83 13
Lisbon, 19 4
Antwerp, 5 7
Hamburg, 8 1
Odense, 5 2
Rotterdam, 62 10
Wasa, 1 7
Aalborg, 54 4
Aarhuus, 10 2
Abo, 5 7
Christiania, 5 8
Vardo, 1 2
New Orleans, 5
Copenhagen, 250 3
Landskrona, 64 14
Brettesnaes, 5 6
Drammen, 50
Stockholm, 147 12
Gothenburg, 9 15

**Soda Ash**—
Naples, 59 t. 6 c.
Antwerp, 6 3
Lisbon, 129 14
Rotterdam, 21 15
Riga, 40 5
Gothenburg, 6 6

**Salt**—
Malmo, 5 t.

**Sodium Bicarbonate**—
Hamburg, 10 c.
Christiania, 2 t.
Copenhagen, 2

**Sodium Carbonate**—
Hamburg, 2 t. 16 c.

**Superphosphates**—
Reval, 30 t.
Riga, 350 2 c.

**Sodium Sulphate**—
Riga, 3 t. 2 c.

**Tar**—
Vardo, 3 t. 10 c.
Brettesnaes, 2 9

**Zinc Oxide**—
Lisbon, 2 t. 3 c.

# PRICES CURRENT.

[THURSDAY, June 21, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... per cwt. | 0 | 8 | 3 |
| ,, Glacial ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... per lb. | 0 | 0 | 6 |
| Fluoric ... ,, | 0 | 0 | 3¾ |
| Muriatic (Tower Salts), 30° Tw. ... per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... ,, | 0 | 0 | 2¼ |
| Nitrous ... ,, | 0 | 0 | 2 |
| Oxalic ... ,, | 0 | 0 | 3 |
| Picric ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... per ton | 15 | 0 | 0 |
| ,, (monohydrate) ... ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ,, | 0 | 1 | 6 |
| Arsenic, white powdered ... per ton | 11 | 15 | 0 |
| Alum (loose lump) ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities) .. ,, | 4 | 12 | 6 |
| Ammonia, ·880 = 28° ... per lb. | 0 | 0 | 3½ |
| ,, =24° ... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ,, | 0 | 0 | 3½ |
| ,, Muriate ... per ton | 22 | 0 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... per ton. | 35 | 0 | 0 |
| ,, ,, (pure) ... ,, | 70 | 0 | 0 |
| ,, Phosphate ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 11 | 13 | 9 |
| ,, ,, (grey), Hull ... ,, | 11 | 12 | 6 |
| Aniline Oil (pure) ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ,, | 0 | 0 | 8¼ |
| Antimony ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... per ton | 7 | 5 | 0 |
| ,, Carbonate (native) ... ,, | 4 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 % ... ,, | 7 | 5 | 0 |
| ,, Liquor, 7 % ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ,, | 11 | 10 | 0 |
| Calcium Chloride ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... per lb. | 0 | 0 | 9 |
| Magenta ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ... per gallon | 0 | 2 | 4 |
| ,, 50/90 ,, ... ,, | 0 | 2 | 3 |
| Carbolic Acid (crystallised 35°) ... per lb. | 0 | 1 | 1½ |
| ,, (crude 60°) ... per gallon | 0 | 3 | 11 |
| Creosote (ordinary) ... ,, | 0 | 0 | 1½ |
| ,, (filtered for Lucigen light) ... ,, | 0 | 0 | 1½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 1 |
| Grease Oils, 22° Tw. ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 13 | 0 |
| Solvent Naphtha, 90 % at 160° ... per gallon | 0 | 1 | 0½ |
| Coke-oven Oils (crude) ... ,, | 0 | 0 | 1¾ |
| Copper (Chili bars) ... per ton | 82 | 5 | 0 |
| ,, Sulphate ... ,, | 21 | 5 | 0 |
| ,, Oxide (copper scales) ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ,, | 13 | 10 | 0 |
| ,, Litharge Flake (ex ship) ... ,, | 15 | 0 | 0 |
| ,, Acetate (white, ,, ) ... ,, | 24 | 15 | 0 |
| ,, ,, (brown, ,, ) ... ,, | 20 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 10 | 0 |
| ,, Nitrate ... ,, | 22 | 10 | 0 |
| Lime, Acetate (brown) ... ,, | 7 | 15 | 0 |
| ,, ,, (grey) ... ,, | 12 | 0 | 0 |
| Magnesium (ribbon and wire) ... per oz. | 0 | 2 | 3 |
| ,, Chloride (ex ship) ... per ton | 2 | 0 | 0 |
| ,, Carbonate ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ,, | 17 | 10 | 0 |
| ,, Borate ... per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ... per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent ... ,, | 0 | 3 | 9 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 4 | 10 |
| **Oils:—** | | | |
| Castor ... per cwt. | 1 | 3 | 0 |
| Cotton-seed ... per ton | 22 | 0 | 0 |
| Linseed ... ,, | 19 | 10 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... per gallon | 0 | 0 | 5¼ |
| ,, American ... ,, | 0 | 0 | 5⅝ |
| Potassium (metal) ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... per ton | 16 | 7 | 6 |
| ,, Chlorate ... per lb. | 0 | 0 | 5½ |
| ,, Cyanide, 98 % ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) ... per cwt. | 1 | 2 | 9 |
| ,, Permanganate ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... per lb. | 0 | 0 | 6½ |
| ,, Sulphate, 90 % ... per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % ... ,, | 7 | 15 | 0 |
| Silver (metal) ... per oz. | 0 | 3 | 6 1/16 |
| ,, Nitrate ... ,, | 0 | 2 | 7½ |
| Sodium (metal) ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 % ... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 % ... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 % ... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 58 % ... ,, | 4 | 10 | 0 |
| ,, ,, (Soda Crystals) ... ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ,, | 21 | 0 | 0 |
| ,, Chlorate ... per lb. | 0 | 0 | 7½ |
| ,, Borate (Borax) ... per ton. | 29 | 0 | 0 |
| ,, Bichromate ... per lb. | 0 | 0 | 3½ |
| ,, Hydrate (77 % Caustic Soda) ... per ton | 7 | 15 | 0 |
| ,, ,, (74 % Caustic Soda) ... ,, | 7 | 2 | 6 |
| ,, ,, (70 % Caustic Soda) ... ,, | 6 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 12 | 6 |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 11 | 3 |
| ,, Bicarbonate ... ,, | 5 | 0 | 0 |
| ,, Hyposulphite ... ,, | 5 | 7 | 6 |
| ,, Manganate, ... ,, | 6 | 15 | 0 |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | 0 |
| ,, Nitrite, 98% ... per ton | 28 | 0 | 0 |
| ,, Phosphate ... ,, | 16 | 10 | 0 |
| ,, Prussiate ... per lb. | 0 | 0 | 5¼ |
| ,, Silicate (glass) ... per ton | 5 | 10 | 0 |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 0 | 0 |
| ,, Sulphate (Salt-cake) ... ,, | 1 | 0 | 0 |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 10 | 0 |
| ,, Sulphide ... ,, | 8 | 15 | 0 |
| ,, Sulphite ... ,, | 5 | 2 | 6 |
| Strontium Hydrate, 98 % ... ,, | 6 | 15 | 0 |
| Sugar, Beet ... per cwt. | 0 | 13 | 9 |
| ,, Cane ... ,, | 0 | 16 | 6 |
| Sulphocyanide Ammonium ... per lb. | 0 | 0 | 7½ |
| ,, Barium ... ,, | 0 | 0 | 5 |
| ,, Copper, 60% ... ,, | 0 | 0 | 8 |
| Sulphur (Flowers) ... per ton | 8 | 5 | 0 |
| ,, (Roll Brimstone) ... ,, | 5 | 15 | 0 |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 1 | 3 |
| Superphosphate of Lime (28 %) ... ,, | 2 | 5 | 0 |
| Tallow ... ,, | 26 | 0 | 0 |
| Tin (metal) ... ,, | 80 | 0 | 0 |
| ,, Crystals ... per lb. | 0 | 0 | 6½ |
| Zinc (Spelter) ... per ton | 16 | 5 | 0 |
| ,, Chloride (solution, 96° Tw.) ... ,, | 5 | 2 | 6 |

# The Chemical Trade Journal,

5, JOHN DALTON-ST., MANCHESTER.

**SATURDAY, June 30, 1888.**


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## Notices.

All communications for the *Chemical Trade Journal* should be addressed, and Cheques and Post Office Orders made payable to—

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Communications for the Editor, if intended for insertion in the current week's issue, should reach the office not later than **Tuesday morning.**

Articles, reports, and correspondence on all matters of interest to the Chemical and allied industries, home and foreign, are solicited. Correspondents should condense their matter as much as possible, write on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication. Sketches should be sent on separate sheets.

We cannot undertake to return rejected manuscripts or drawings, unless accompanied by a stamped directed envelope.

Readers are invited to forward items of intelligence, or cuttings from local newspapers, of interest to the trades concerned.

As it is one of the special features of the *Chemical Trade Journal* to give the earliest information respecting new processes, improvements, inventions, etc., bearing upon the Chemical and allied industries, or which may be of interest to our readers, the Editor invites particulars of such—when in working order—from the originators; and if the subject is deemed of sufficient importance, an expert will visit and report upon the same in the columns of the *Journal*. There is no fee required for visits of this kind.

We shall esteem it a favour if any of our readers, in making inquiries of, or opening accounts with advertisers in this paper, will kindly mention the *Chemical Trade Journal* as the source of their information.

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## Advertisements.

Small, prepaid Advertisements, of Situations Wanted or Vacant, Premises on Sale or To be Let, Miscellaneous Wants, and Specific Articles for Sale by Private Contract, are inserted in the *Chemical Trade Journal* at a charge of One Penny per word for each insertion—minimum charge One Shilling.

Trade Advertisements, Announcements in the Directory Columns, and all Advertisements not prepaid, are charged at the Tariff rates, which will be forwarded on application



## BLEACHING BY ELECTRICITY.

A FEW words on this subject seem due from us to our readers. Unfortunately in our last week's issue we had no space at our disposal to make a few remarks upon the subject of W.M.'s letter, which, though from one standpoint is purely a logical argument, is yet, we believe, based upon misconceptions, the seriousness of which do not seem to have engaged the perception of the controversialists. The process has its weak points as well as its strong ones, but we have not seen any criticisms of those factors which seem to us to be vital to the success of the scheme when carried out on the large scale. On the other hand, those in favour of the process have urged that the bleaching efficiency of the electrolysed solution is about three times greater than that of ordinary bleach chlorine; and this statement has been smiled at rather strongly by the opponents, yet no one has even ventured an opinion how this might possibly be the case.

Bleachers, paper makers, dyers, and calico printers are evidently taking great interest in this question, and as we have had many inquiries upon the subject, it would perhaps be well if we added a few more notes to what we have already said. In reply to W.M.'s remark anent the efficiency of the dynamo, what we said in our last article holds good. Judging from the bleaching power of the electrolysed solution, Messrs. Cross and Bevan's figures do not show any serious loss of electrolytic efficiency; they found but little chlorate was formed, and they ascertained the conditions necessary to secure this end. If we judge alone by the arsenic consuming power of the solution, we must confess the results are different, but it has been entirely overlooked that there may be a chemical reason for the apparent discrepancy. Theories are formed upon an accumulation of facts, and when one is told by practical men that of solutions of equal chemical strength one is three times more energetic than the other it behoves one carefully to consider whether the correct theory has been propounded. In the present case we may suggest that the salts of chlorous oxide might possibly have something to do with this discrepancy. Miller tells us that the chlorites do not oxidise a solution of arsenious acid in nitric acid, and on this account are distinguished from the hypochlorites, yet it is a well-known fact that the chlorites are exceedingly energetic bleaching agents. Judging from the few experiments we have made, we have come to the conclusion that the electrolysis of magnesium chloride is not an easy operation to explain in the present state of our knowledge, and when the true explanation is given we may find that the old theories will very properly explain the new facts. So far as the production of a bleaching agent is concerned, we are satisfied that the Hermite process will prove a factor to be reckoned with by the older Leblanc makers, and the only points upon which we desire to have fuller information are, the prime cost of the plant and the depreciation yearly encountered, together with a statement showing the tear and wear of the anode and cathode with which, in platinum, the electrolysing tank is fitted. If these points can be satisfactorily maintained there is in our opinion a great future for the Hermite process.

## THE MAGNESIUM LAMP.

ACCORDING to the *Centralblatt fur Elektrotechnic*, the magnesium lamp invented by H. A. Gratzel, of Hanover, developed the following surprising results. Our authority says:—

Since it has been found practicable to produce magnesium electrolytically on the large scale, and the price has consequently fallen within a few years to about one-fifth of its former amount, the attempt has been made to utilise the

property of this metal (hitherto little regarded) of burning with great lustre, in the construction of sources of intense light. There can be no doubt that with the increasing application of the magnesium light, the technical improvement of the lamps will proceed hand in hand. The burner here measured was made for experimental purposes only, but it yields a light burning with sufficient steadiness.

There can be burnt in this lamp as many as eight magnesium ribbons of 2·5 m.m. in width and 0·13 m.m. in thickness. It is, however, easy to burn any smaller number at pleasure. Even on burning a single ribbon there was no extinction, as it often happened with the earlier lamps. The strength of the light fluctuates more than in a well-regulated arc lamp, but the fluctuations are more gradual, so that they are perceptible only on the photometer screen, but not with the naked eye. They certainly occasion disturbance, and I have sought to eliminate their influence by increasing the number of observations. The greater the number of the ribbons burning, the smaller is the relative amount of these variations.

The white fume, in which state a part of the oxide formed during combustion escapes, found its exit through the ventilation shaft.

The escape pipe was firmly connected with a reflector attached to the lamp, so that the lamp could not be used without it. But as I wished to ascertain the strength of light which the lamp yields without reflector, it was pasted over with dead black paper. In this manner the strength of light for different numbers of ribbons could be conveniently determined. Lastly, as the concave mirror will be used with the lamp in many cases, the paper was removed, and after the polish of the reflector was restored, measurements were made with the reflector. These results of the latter, of course, hold good only for the lamp in question. The aperture of the parabolic reflector had the diameter of 39 centimetres. This is not the place to enter upon the details of the construction of the burner.

For determining the consumption of magnesium, the rolls upon which the supply of ribbon was coiled were weighed before and after the experiment, and the time during which the lamp was burning was accurately noted.

The strength of light was measured in the horizontal direction. A few determinations made at 33° (greater angles could not be used on account of the reflector) showed a decrease of the strength of the light of about 25 per cent.

| Number of ribbons | Strength of light in normal candles. | | Without reflector. | | Hourly consumption of ribbon per 100 candles. |
|---|---|---|---|---|---|
| | Without reflector. | With reflector. | Candles per ribbon. | Consumption of magnesium per hour ribbon. | |
| | | | | Grammes. | Grammes. |
| 1 | 150 | 3,200 | 150 | 16·7 | 11·14 |
| 2 | 237 | 5,880 | 118·7 | 16·7 | 14·10 |
| 4 | 450 | 8,000 | 112·5 | 16·7 | 14·80 |
| 6 | 700 | 11,300 | 117 | 16·7 | 14·15 |
| 8 | 950 | 17,000 | 119 | 16·7 | 14·03 |

The strength of light obtained per ribbon is therefore greatest when only one ribbon is burning. It sinks as soon as a second is introduced, but remains then approximately constant whether two or eight ribbons are in use. The somewhat abnormal result obtained with four ribbons is probably due to an experimental error.

The price of magnesium ribbon is at present 45s. per kilo. If the lamp burns with eight ribbons, it consumes hourly 134 grammes magnesium. If we disregard the first price of the lamp, it costs 6s. per hour burning, and 100 normal candles measured without reflector cost hourly $\frac{33}{100}$ of 1s.

The lamp examined pushes forward hourly 32 metres of each ribbon. This speed appears to be too great, and can be decidedly reduced without reducing the strength of light of the lamp. Some of more recent construction push forward only 24 metres hourly. It appears also that the price of magnesium will shortly be reduced to 30s. per kilo. Hence an eight ribbon lamp would consume hourly 100 grammes of magnesium, at the price of 3s., and the hourly cost of 100 normal candles would be only $\frac{33}{1000}$s.

But even this price is still much too high to admit of the magnesium light competing with the electric light or with gas. The natural sphere of the magnesium light is different. It will be used wherever an intense light is demanded for a short time, and where gas-piping and electric installations are not at hand. For such purposes magnesium is the cheapest source of light. The magnesium light is readily portable, and can be kindled at any moment by means of a match, and as quickly again extinguished.

It is thus suited for military purposes, for luminous effects in theatres, in photography, in nightly building operations of short duration, in ships, etc.

Lamps have also been recently constructed arranged for burning several hours (during which the mechanism does not need to be wound up again), and the greatest intensity of light is thrown, not horizontally, but downward. Such burners are already in use for lighting up large halls, etc.

There is no need in electro-technics to fear the competition of the magnesium light, but one should rather seek to improve the preparation of this metal.

## UNIFICATION OF THE METHODS OF ANALYSIS IN THE BELGIAN AGRONOMIC STATIONS.

METHOD OF THE CONVENTION FOR THE ESTIMATION OF THE PHOSPHORIC ACID SOLUBLE IN WATER AND IN CITRATE OF AMMONIA IN MANURES.

MESSRS. CRISPS, Mercier, de Molinari, Glasmacher, Warsage, Claes, and Masson respectively, directors of the agronomic laboratories of the State at Antwerp, Hasselt, Liège, Gand, Mous, Louvain, and Gembloux, met recently under the presidency of M. Petermann, of Gembloux, and have established a common method for the estimation of phosphoric acid in manures, soluble in water and in citrate of ammonia, which is as follows:—

Two grammes of ordinary superphosphate (or one gramme of a rich sample, say over 20 per cent.) are triturated in a mortar with water and thrown upon a filter. The filter is washed with water until about 200 c.c. have passed through; to the filtrate is added 1 c.c. of nitric acid, and the volume of the solution is made up to 250 c.c.

The filter, and the insoluble matter contained in it, is now introduced into a 250 c.c. flask with 50 c.c. of Petermann's alkaline citrate of ammonia solution, and allowed to digest for one hour on the water bath at a temperature of 38°–40° c. After rapidly cooling, the flask is filled up to the mark with distilled water.

Of the above filtered liquid (the citrate of ammonia solution), take 50 c.c. and mix it with 50 c.c. of the aqueous solution, acidify with nitric acid and precipitate, with a sufficient quantity (about 100 c.c.) of ammonium nitromolybdate.

The remainder of the operations remain as for the ordinary estimation of phosphoric acid by solution of the phosphomolybdate precipitate in ammonia and precipitation with magnesia mixture.

For manures containing less than 10 per cent. of phosphoric acid the weight to be taken for analysis should be 4·0 grammes; ordinary superphosphates, 2·0 grammes; while precipitated phosphates require only 1·0 grm. to be digested with the alkaline citrate of ammonia.

**Petermann's Alkaline Citrate.**—Dissolve 500 grammes of citric acid crystals in water, and add cautiously to 700 c.c. of ammonia solution of 0·92 sp. gr., avoiding too great a rise of temperature. Bring the concentration of the liquid to 1·09 sp. gr. at 15° c., and add to each litre 50 c.c. ammonia solution of 0·92 sp. gr.

**Nitromolybdate Solution.**—Take 100 grammes of molybdic acid and 450 grammes of ammonia solution of 0·96 sp. gr., dissolve, and pour the solution into 1,250 grammes of nitric acid of 1·21 sp. gr. Allow to stand for forty-eight hours, and filter.

**Magnesia Mixture.**—Dissolve 100 grammes of chloride of magnesium and 200 grammes of chloride of ammonium in water. Add gradually to this solution 400 grammes of ammonia of 0.96 sp. gr. Make up to 1,250 c.c. with distilled water, allow to settle twenty-four hours, and filter.—*L'Engrais.*

MINING TERMS.—Mr. W. E. Nicholson has compiled "A Glossary of Terms used in the Coal Trade of Northumberland and Durham." Readers puzzled at terms such as "darg," used near Berwick; "hedgehog" (when not applied to the little animal), and "stone-men"—terms such as are often brought out in inquests and reports of colliery accidents—may turn with advantage to this Glossary, which has added also some useful appendices.

## CHEMICAL ENGINEERING.*

VII.

COPPER is a metal largely used for operations in which heat and cold have to be transferred to solutions or solids in solution. Inspection of Table XI. will show us at a glance, that not only is copper a good conductor of electricity, but as a conductor of heat it stands next to silver, and the table shows it as possessing nearly 78 per cent. of the conducting power of that metal. Copper is mostly used in what I may term the finer branches of the chemical industrial arts, and for contact with solutions which are either neutral in character or of a slightly acid reaction, and in which iron cannot be well used. Stills and condensers are often made of copper on account of the excellent conducting power of the metal, being, as shown in the table, nearly seven times greater than iron of equal thickness, while its malleability and high tensile strength enables thinner contact surfaces to be made with great facility and safety.

Unfortunately copper is readily attacked by many chemical substances; boiling sulphuric acid when concentrated dissolves the metal, evolving sulphurous acid at the same time. Weaker acid does not act so energetically, unless air be present, and then the metal is quickly oxidised, and sulphate of copper passes into solution. Nitric acid, either weak or concentrated, acts readily upon copper, giving off nitrous fumes; the action is the more energetic as the temperature is allowed to rise. The experiment has been tried of sending out 80° Tw. nitric acid from the works in copper drums in place of glass carboys, but I need not tell you that the experiment was unsuccessful.

The weaker organic acids, such as acetic and lactic acids, have very little action comparatively upon copper, and dilute solutions of these may be operated upon in copper apparatus without danger. The *bête noir* of copper plant, and indeed of most of the alloys of copper is ammonia. In the presence of air, ammonia acts upon exposed parts of copper apparatus very readily, and the sulphide of ammonium acts even more energetically, ultimately reducing a very thick plate to a scaly mass of sulphide. Pure fixed alkalies have but little action upon copper, but the impurities of ordinary commercial alkalies cause much wear and tear. The following analyses, showing the impurities in copper as usually supplied to the chemical arts, will not be out of place here:—

| | Ag. | Pb. | As. | Sb. | Bi. |
|---|---|---|---|---|---|
| English tile copper | trace ... | trace ... | 0·07 ... | trace ... | 0·02 |
| Best select ..... | 0·03 ... | 0·07 ... | 0·03 ... | trace ... | 0·05 |
| ,, ,, ..... | 0·04 ... | 0·09 ... | 0·15 ... | 0·05 ... | 0·05 |
| ,, ,, ..... | 0·03 ... | 0·03 ... | 0·14 ... | 0·06 ... | 0·05 |
| Sheet copper ..... | 0·06 ... | 0·18 ... | 0·10 ... | 0·02 ... | 0·18 |
| Bolt ,, ..... | trace ... | 0·13 ... | 0·01 ... | trace ... | 0·02 |

The alloys of copper with other metals are perhaps as important as copper itself, and these are put to a very great variety of uses in the chemical and allied industries; but it will be more convenient to take these alloys together after we have discussed the properties of the various metals of which they are composed.

Lead is perhaps the chemical manufacturers' metal *par excellence*. Not because it has any great conducting power for heat, as it is perhaps the lowest on the list of Table XI., and its properties of malleability, ductility, and tenacity are of the lowest order. Nevertheless, it is a very useful metal on account of the very slight action that acids and acid gases have upon it. The lead which is used in this connection is what is known as soft chemical lead; ordinary lead often contains considerable quantities of silver, antimony, copper, and iron, and these impurities harden the metal and render it quite unsuitable for some purposes. The following analyses will serve to show the amount of impurities in ordinary chemical lead:—

**Parts per Million.**

**Milligrammes per Kilogramme.**

| | 1. | 2. | 3 | 4 |
|---|---|---|---|---|
| Antimony ... | 16·92 ..... | 18·62 ..... | 264·22 ..... | 32·44 |
| Copper ..... | 21·42 ..... | 13·11 ..... | 14·32 ..... | 18·74 |
| Iron ..... | 2·71 ..... | 2·44 ..... | 12·36 ..... | 1·88 |
| Cadmium ... | 1·14 ..... | 1·42 ..... | 1·26 ..... | 1·87 |
| Bismuth ..... | 4·18 ..... | 2·26 ..... | 21·64 ..... | 3·76 |
| Zinc ..... | 2·16 ..... | 1·06 ..... | 2·24 ..... | 3·07 |
| Sulphur ..... | 1·41 ..... | 1·86 ..... | 2·27 ..... | 1·16 |
| Silver ..... | 21·84 ..... | 14·46 ..... | 38·66 ..... | 15·57 |

* A course of lectures delivered by Mr. George E. Davis at the Manchester Technical School.—*All rights reserved.*

Lead, as I have already mentioned, is very extensively employed in chemical operations, and mainly on account of its softness and plasticity, which it possesses in a very high degree; but it must not be forgotten that the surface of such a metal is easily removed by attrition, and that lead salts are very poisonous. Especially should the proprietors of waterworks consider this question, as water containing peat acids will dissolve lead in sufficient quantity when flowing through service pipes to render the supply poisonous. This may also be the case when leaden vessels are used for preparing articles of food and drugs, but there is no excuse for using lead for the preparation of alimentary substances now that tin and enamel is so plentiful and easily applied.

Tin is a metal not much used *per se*, except perhaps for the condensing coils of water stills. For many purposes it would be a most useful metal if price permitted of its employment; but as it is, its chief use is in making tin-plates and in mixing with copper to form alloys.

Tin-plate is sheet-iron coated with a thin layer of tin of high purity. In the operation an alloy of iron and tin is formed on the surface of the plate, and a firm adhesion of the tin coating secured. Tin-plate is very durable so long as the coating of tin is perfect; but if the iron becomes exposed it will rust even quicker than plain iron. This also happens when tin-plate is used in contact with chemical solutions, such as for instance the moulds used in brine for ice-making. On this account it is better to use in many cases what is termed "terne-plate" which much resembles tin-plate, but the iron is coated with an alloy of lead and tin. Terne-plate stands the action of salts fairly well, as I can personally testify.

Zinc is a metal not much used by itself in chemical industries, as it is dissolved by both acids and alkalies very readily, and it is on this account that brass will not stand the action of alkaline solutions. In certain operations, however, it is very useful, as its sulphur compound is of a white colour, and therefore the formation of it does not cause discolouration when present in but traces. This is especially the case in the manufacture of carbolic acid, where sulphur compounds attack the substance of the condensing worm and discolour the distillate. The condenser is therefore made of sheet zinc, which is the only metal found to answer on an industrial scale.

Zinc is rather a peculiar metal to work with, as it is brittle at both ordinary temperatures and at high temperatures; but between 200° F. and 250° F. it is capable of being rolled into sheets, provided it is free from iron and lead. Zinc powder may be produced by pouring melted zinc into an iron mortar, and powdering it with the pestle as it solidifies.

What is called "galvanised iron" is merely sheet iron coated with a thin skin of zinc, and is made in a manner very similar to tin-plate, by immersing thoroughly cleansed iron into a bath of melted zinc kept covered with powdered salammoniac. A small quantity of iron is dissolved by the melted zinc, forming a very brittle alloy, which is deposited in pasty masses at the bottom of the zinc pot. These masses have the composition:—

| | |
|---|---|
| Zinc ..... | 94 |
| Iron ..... | 6 |
| | 100 |

but it is probably a mixture of the alloy with much free zinc. Galvanised iron is much employed for roofing purposes in situations where there is a fairly pure atmosphere, but it is ill adapted for use where it would be exposed to acid vapours, as the zinc surface would be readily attacked.

Platinum is a metal which has come largely into use during the past few years, and there seems every probability of its further extension. Hitherto it has been nearly exclusively employed for the rectification of oil of vitriol on the large scale, though a few minor uses have been found for it. Platinum enjoys the property of not being attacked by the simple acids—sulphuric, nitric, or hydrochloric—but it is readily dissolved by the two last, and is even soluble in nitric acid after being alloyed with silver. An alloy of silver, with one-third of its weight of platinum, is used by dentists on account of its great elasticity.

The caustic alkalies, nitrates of the alkalies, and any combination producing phosphorus, arsenic, or sulphur, all rapidly corrode platinum at a high temperature, and all the more fusible metals readily form alloys with it. Carbon and silica at high temperatures also render platinum very brittle. Most of the platinum in the market is really an alloy of

platinum and iridium, sometimes with rhodium as well. This alloy is much harder than pure platinum, and stands wear and tear much better, as platinum is really a soft metal, and unless great care is taken the tear and wear is considerable.

Platinised asbestos has now become an article of commerce. It is largely used in the manufacture of sulphuric anhydride. Sulphurous acid and oxygen passed over heated platinised asbestos form sulphuric anhydride at a much lower temperature than if simply passed through a red-hot tube. The platinised asbestos of commerce contains about 10 per cent. of metallic platinum.

*(To be continued.)*

## A NEW FORM OF THE DRINK TRAFFIC.

AT a recent meeting of the Edinburgh City Parochial Board, Mr. M'Gibbon said that at a meeting of the Relief Committee the inspector stated that a large number of applicants for relief came in a very stupid and half-mad state, caused by drinking methylated spirits. From various sources they had heard lately that the sale of this spirit was general, and he understood that it was composed of the very coarsest spirit mixed up with at least 10 per cent. of turpentine. The stuff was causing much mischief among the poorest class of the community, and, seeing that the number of their paupers might be considerably increased from this cause, he moved that the board make a representation to the Secretary of State for Scotland, suggesting that a clause might be inserted in the new Police Bill, or adopt some other means, by which the sale of methylated spirits would be regulated and restricted more than it is at present.—Mr. Mackenzie, chemist, seconded the motion, and said it was not that the spirit was bad, nor was it that it was mixed with turpentine. It was that while common whisky was understood to be 12 over proof, methylated spirit was 62 over proof, and had an immensely bad effect upon the brain. Added to it was a certain percentage of other spirit, which it was meant should prevent it from being used for drinking purposes; and in this particular state they found drysalters and the lower order of chemists selling it as drink, their places of business on Sunday mornings being like beehives with the wrecks of humanity, whom it ultimately drove to madness. These chemists and drysalters paid a licence of ten shillings for selling this spirit, and in this way they were actually carrying on a legal traffic, but a most dangerous one.—The motion was unanimously agreed to, several of the members expressing the opinion that the duty or licence should be made £10 or £15.

## INTERESTING TO CHEMICAL MANUFACTURERS.

A GERMAN correspondent says that although a convention was entered into by the saltpetre manufacturers in the province of Tarapaca, the production was checked by the scarcity of labour, and the exportation only amounted to 15,299,655 quintals, of which nearly one half was shipped from Iquique. The consumption of saltpetre for manuring purposes is undoubtedly increasing, especially in Germany, which took upwards of 3,500,000 quintals during the past year. The United States rank next as buyers, and figure for about 1,500,000 quintals, while Great Britain only imported 294,540 quintals. The iodine convention has been joined by all the manufacturers, who have engaged to uphold it until the end of 1889, and the price has been fixed at 9d. for all consumers, as it was believed that differential prices for various purposes would give rise to abuses. The exportation in 1887 from Iquique, Pisagua, and Tocopilla amounted to 1,600 quintals. As regards silver, the output continues to increase, and the two amalgam works in Iquique dispatched last year 33,000 kilos. of fine silver, mostly to be coined in Santiago. The exportation of calcium borate, containing 25 to 28 per cent. of boracic acid, to Hamburg reached nearly 18,000,000 kilos., but owing to the fall of the price in the European markets, no shipments have been made for some months. One of the works situated in the centre of the borax fields now produces crystalised borax and boracic acid of excellent quality, and the proprietors believe that they will shortly be able to exclude their European competitors from the West Coast. Nearly all the coal consumed in this district is imported from Great Britain, though the Germans recently sent out a cargo on trial.

## THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

COURSE IN CHEMICAL ENGINEERING.

THIS course is so arranged that the student will receive a suitable general training in mechanical engineering, and at the same time will devote a portion of his time to the study of the applications of chemistry to the arts, and especially to those engineering problems which relate to the use and manufacture of chemical products. The course occupies four years. The scheme here presented has been perfected only as regards the instruction in the first three years. The instruction in the fourth year will be so arranged that the student will be able to exercise a certain choice as to the special topics to which he wishes to devote his greatest attention. A general outline of required subjects in the fourth year has, however, been adopted. It is expected that the graduates in this course will find employment as engineers, having to deal with problems of construction in connection with dyeworks and bleacheries, oil refineries, gasworks, sugar refineries, soap works, paper and pulp mills, chemical works, and various other branches of industry, where such special training is demanded.

### First Year.

*Common to all Regular Courses.*

| FIRST TERM. | SECOND TERM. |
|---|---|
| Solid Geometry. | Algebra. |
| Algebra. | Plane Trigonometry. |
| General Chemistry. | General Chemistry. |
| Chemical Laboratory. | Chemical Laboratory. |
| History of the English Language. | Political History. |
| English Composition. | French (or German). |
| French (or German). | Mechanical and Freehand Drawing. |
| Mechanical and Freehand Drawing. | Military Drill. |
| Military Drill. | |

### Second Year.

| FIRST TERM. | SECOND TERM. |
|---|---|
| Mechanism. | Mechanism. |
| Analytic Geometry. | Drawing. |
| Descriptive Geometry. | Differential Calculus. |
| Physics. | Physics. |
| Analytical Chemistry. | German. |
| German. | English. |
| | Analytical Chemistry. |

### Third Year.

| FIRST TERM. | SECOND TERM. |
|---|---|
| Mechanical Engineering. | Mechanical Engineering. |
| Integral Calculus. } | Drawing. |
| Applied Mechanics. } | Mechanical Engineering Laboratory. |
| Physics. | Applied Mechanics. |
| German. | Physical Laboratory. |
| Drawing. | German. |
| Industrial Chemistry. | Industrial Chemistry Lectures. |
| English. | Industrial Chemistry Laboratory. |
| Elements of Organic Chemistry. | English. |

### Fourth Year.

| FIRST TERM. | SECOND TERM. |
|---|---|
| Mechanical Engineering. | Mechanical Engineering Laboratory. |
| Engineering Laboratory. | Applied Mechanics. |
| Applied Mechanics. | Thermo-Chemistry. |
| Metallurgy. | Fuels: Valuation and Composition. |
| Political Economy. | Shop-work. |
| Applied Chemistry. } | Applied Chemistry: Thesis. |
| Lectures and Laboratory. } | Memoirs. |
| Shop-work. | |

APPLIED CHEMISTRY.

The manufacture of chemical products is described in a course of lectures. This course describes in detail the processes in use; and the mechanical appliances, which have now become of prime importance, are discussed at length, with the aid of drawings and pictures.

The laboratory of Industrial Chemistry consists of a series of rooms fitted with the needful apparatus for the preparation

of chemicals, on a considerable scale. The students are here taught the preparations of chemical products from raw materials, the utilisation of the by-products, and the methods for the purification of chemicals. A special assignment of work is made for each individual, so that the student may see a varied line of work. The laboratory contains kettles of various patterns, stills, presses, tanks, a centrifugal dryer, filter-press, crystal dryer, furnace, and a variety of other apparatus.

## COMMERCIAL EDUCATION.

THE Committee appointed as a result of the Conferences convened by the London Chamber of Commerce, to consider the best means of introducing a system of commercial education which would meet the requirements of a modern business, found it necessary early in its proceedings to appoint a sub-committee, upon which the following gentlemen agreed to serve, viz.:—Sir J. Lubbock, Sir B. Samuelson, Sir H. E. Roscoe, Sir G. H. Chubb, Mr. H. Kimber, M.P., Mr. Magniac, Mr. J. H. Tritton, Mr. E. H. Carbutt, Mr. Charles Morley, Mr. Walter Leaf, Mr. Frank Debenham, Mr. E. Power, and Rev. Dr. Wace. This sub-committee has held several sittings, and has now issued to leading commercial firms in London and the provinces a circular letter of inquiry, together with a scheme which has been prepared for the improvement of commercial education. This step has been taken to elicit the opinion and criticism of practical business men in regard to the suggested curriculum, whilst revisions in detail are sought also from masters of schools and other authorities on practical education. The widest possible expression of opinion is desired as to whether the suggested scheme would satisfy the conditions of a sound education for entrance on commercial life at the age of sixteen or seventeen, or if there are any alterations, general or particular, considered desirable. Copies of the scheme may be obtained at the offices of the London Chamber of Commerce (Botolph House, Eastcheap) by those persons who may desire to express their opinion upon it, and the sub-committee will receive replies, in writing, up to the 23rd June, both from those who may have received the papers already and those who may apply before that date. The scheme, as it stands, proposes as obligatory, subjects for examination for a commercial certificate (1) English; (2) Latin; (3a) French; (3b) German, Spanish, or Italian; (4) History of British Isles and Colonies, general and modern history, including commercial history; (5) Geography, physical, political, commercial and industrial; (6) Mathematics; (7) Drawing. Proficiency is also required in at least one of the following:—Physics, chemistry, natural history, commerce, and political economy.

## USING OIL AS FUEL.

ISAAC M. SOWERS, ex-mayor of Oil city, Pa., was seen at Lima, O., by a correspondent in reference to the progress being made in introducing Ohio oil as fuel. Mr. Sowers had just returned from Chicago, where he has been operating for some months. He said the insurance companies had given them trouble, but the oil people were able to demonstrate that oil fuel did not increase the risk, and they expected in good time to overcome the prejudice. They were meeting with about the same opposition in this particular that had confronted the electric light companies. The board of underwriters of Chicago are investigating the matter. They had made a very careful investigation, and he had hopes from this fact that their report would be favourable. In case it is favourable several large concerns will at once begin to use oil for fuel instead of coal, among them the Leland House. The Leland had used it, but had been stopped by the insurance companies.

The largest concern now using Lima oil as fuel is the Union Steel Works of Chicago. It is one of the largest works of the kind in the world. They are using 1,000 barrels of oil a day where they formerly used 400 tons of coal. They have not entirely abandoned the use of coal, but it has almost been supplanted. In these works it requires sixty-five men less to do the work than with coal. This saving of labour is in firing, hauling ashes, etc. The item of ashes is quite important to such a large concern, as they remove them outside the city. Mr. Sowers could not give any figures on the relative cost of coal and oil as fuel based on actual experience. The Chicago Steel Works and other large establishments from whom such figures would be important had refused to furnish them. The Leland House had used eighteen barrels of oil a day, at a cost of $5 less per day than coal.

Mr. Sowers said they had met with more success in using oil in burning brick than in any other industry. He thought the saving was greater in this than in anything else in which tests had been made. He gave the names of the following Chicago firms who are burning brick with oil:—May, Purrington, and Co., the Purrington-Kendall Brick Company, W. D. Owen, J. B. Legnaw, and the American Terra-Cotta Company. The Pullman Palace Car Company is among the Chicago manufacturers who have adopted the new fuel. Within the last few weeks it has been used successfully in burning lime.—*Oil, Paint, and Drug Reporter.*

## THE POTASSIUM CHLORIDE INDUSTRY.

THE new potassium chloride factory in Langensheim, Harz, erected by the Kalisalzwerk Vienenburg, will commence operating in a few days. The Potassium Chloride Association has therefore informed the separated factories, among which are the Vereinigte Chemicalien-Fabriken at Leopoldshall and the Stassfurter Chemische Fabrik, that the Kalisalzwerk Vienenburg will in future manipulate its own carnellite. The oversea export of potassium chloride has for the present almost entirely ceased, for ships can hardly be found to accept freightages except at very high rates to North American harbours owing to the lack of return cargoes. Stocks have in consequence grown very large, and the lately announced limitation of the raw salt output will probably prove insufficient. It is hoped, however, that this temporary stagnation in the export trade will be compensated for in August.

## NATURAL GAS IN PITTSBURG.

PITTSBURG has long been known as the Birmingham of the New World, and it has been justly proud of the title. As a place for a comfortable home, however, it was formerly not to be thought of for a moment. Now, presto, all is changed. One utterly fails at first to appreciate the wonderful transformation that has taken place here during the last four or five years. The sky is no longer obscured by clouds of smoke and coal and soot, and it is not now necessary to light the street lamps by 2 or 3 p.m. From the heights of Mount Washington, on the western side of the Monongahela river, I was able to obtain an excellent bird's-eye view of both Pittsburg and Allegheny City and of the hills beyond. The atmosphere was as clear as that of New York, and the large buildings were as distinctly visible as those on the lower part of Manhattan Island as seen from the *Tribune* tower. A few years back nothing would have been discernible but a black and smoky cloud overhanging and folding in like a blanket the whole valley in which the business portion of the two cities is located.

This wonderful change is due wholly to the substitution of natural gas for the soft coal of this region as a fuel, both for domestic and for manufacturing purposes. Through the courtesy of Messrs. Jones and Laughlin I have been able to make a very thorough inspection of their system of using natural gas in heating their large furnaces, boilers, and in fact, everything else where fire is needed. The works are among the largest here. A single three-inch gas pipe, the valve of which was only about one-eighth open, supplied the gas for a large heating furnace; in other words, only about one-eighth of the capacity of the pipe was required to furnish the necessary amount of heat. A perfectly steady temperature is maintained, and, by the proper care in regulating the amount of air admitted to the burning gas, very little heat escapes up the chimney. At the same time it is possible to put in a heavier charge and to bring it out in much less time than by the former method, the gain in the output of the furnaces being estimated at not less than 15 per cent. At the puddling furnaces the feeding pipe is only two inches in diameter, and the valve controlling the flow of gas was only one-sixteenth open. The large boilers for producing steam used in running the machinery are forty-eight inches in diameter and thirty feet long, with six ten-inch flues. A boiler of this kind is fed by a two-inch gas pipe, the valve in which was only about one-half open. When the boilers become hot, and the flow of gas been adjusted, they require

little further attention, the gas flow being steady and continuous. There is no opening or shutting of doors, no blank spaces on the grate bars for the entrance of cold air, no shovelling of coal nor carting away of ashes, and, in fact, nothing for the attendant to do but to keep an eye on the steam gauge and regulate the flow of the gas, as may be desired.

In addition to the heating furnaces referred to and the Siemens' heaters used in the manufacture of steel, these works have 90 puddling furnaces and 72 boilers. The employés number nearly 5,000, and the production of the works for a recent month, taken at random to indicate the output, consisted of puddled iron, 5,900 tons; iron heated in ordinary and Siemens' furnaces, 13,000 tons; and steel production, 7,300 tons. Of course all this metal was also reduced to plates, bars, etc., the steam to run the heavy machinery being produced in the boilers mentioned. Before the introduction of gas the works consumed over 300,000 tons of coal yearly; the whole establishment is now fed by a single gas pipe twenty inches in diameter, the pressure in which is only about one pound to the square inch. The pressure in the pipes, while subject to control, varies somewhat at different times, but never, of late, greatly exceeds that mentioned, and the entire works have been run on a pressure of only three ounces to the square inch.

The wonderful heat-producing power of this gas is due chiefly to the fact that a very large percentage—in some cases nearly 90 per cent.—of it is hydrogen, the greater calorific qualities of which are well known. A given weight of hydrogen will produce in burning three times as much heat as the same weight of carbon. The value of gas in an establishment of this kind, as compared with coal, is dependent in part, of course, upon conditions under which the two fuels can be obtained. It is estimated, however, that there is an average saving by the use of gas of 60 to 75 per cent., of which nearly one half is represented by the cost of the fuel and as much more by the cost of labour and materials. There are no ashes to be carted away, no railroad sidings and no trestles for moving coal-cars, no switching charges, no wear and tear of waggons, carts, etc., nor is there a small army of employés to take charge of these adjuncts to the burning of coal, while, at the same time, there is a very considerable increase in the product of the mills. Indeed, it was confidently asserted that the mills could not afford to use coal if it were delivered to them free of charge.

The remarkable purity of the gas is another important feature in its favour, and for this reason it is especially valuable in puddling furnaces, where the iron shows great readiness to mix with foreign substances contained in the fuel. Wherever the gas is used an unusually large quantity of air is required, as compared with manufactured gas, to ensure perfect combustion, and there is no doubt but that great improvements in the construction of furnaces and other heating apparatus will be made as the facilities for preserving the gas are increased and the importance of not wasting it becomes more apparent.

Glass making is said to be Pittsburg's oldest industry, and the annual product of its glass factories is placed at $10,000,000 in value. The natural gas is peculiarly well adapted for this work, and the glass produced is superior in every respect to that manufactured in the old way. Both window glass and plate glass are made of a quality equal to or better than those obtained from Europe; this is especially true of plate glass, and, as a consequence, the demand exceeds the supply. Manufacturers attribute their success directly to the use of natural gas. Not only is the glass better, but it is more economically made than by the use of coal for fuel, the saving it is claimed being equal to the cost of the gas.

In the use of gas for cooking and heating dwelling-houses, the only modification of the old range and open grate, built for burning coal, consists in filling up the old fire boxes with broken stone, brick, or other similar material. The gas is admitted at the bottom of the grate through an extension of the pipe which enters the house, and it distributes itself through the open stone work. The heat is intense. The convenience to housekeepers in starting and maintaining fires must be apparent.

The population of Pittsburg, including Allegheny City, is over 200,000. The number of houses is estimated at 50,000, in about one-half of which natural gas is the only fuel now used, and the number is constantly increasing. One gas company alone added over 3,000 customers to its list last year. There is not a single manufacturing establishment of any importance which now uses coal or anything but natural *gas for* fuel. In fact it is impossible for concerns using coal to compete successfully with those using gas. Conservative estimates made by experts give the amount of coal that is now being displaced in Pittsburg and Allegheny City alone by the use of natural gas at over 4,500,000 tons annually, and if account be taken of the surrounding district the quantity is much larger.—*Pittsburg Cor. Tribune.*

## BORAX IN DEATH VALLEY.

THE following facts in relation to Death Valley are given by Mr. Henry Melone, who returned from there a few days ago, says the *Ingo Independent*. On arriving at Coleman's Borax Works Mr. Melone inspected the works carefully. Borax is there in apparently inexhaustible quantity. The deposits are usually but a few inches in thickness where first opened, but get thicker as they are penetrated till they attain a depth of two feet or more. Thousands of acres are covered by the deposit. Adjoining the borax deposits are vast deposits of soda and salts. Great mounds of salt lie around, glittering white, that contain thousands of tons. The salt is fit for use as mined.

The proportion of pure borax contained in the mass ranges from 30 to over 90 per cent. Great quantities of pure crystals are found. Vast masses are borate of lime, containing 90 per cent. of borax. The crude stuff is shovelled into large waggons and hauled to the reduction works close by. Here it is put through a process of boiling, purifying, and crystallising; it is then dried and sacked, ready for shipment. The solution in which the borax is first dissolved is drawn off from the tanks, run into ground vats, and then evaporated. The residuum is taken up and worked over; it contains a large percentage of borax and soda. Twenty horses are constantly employed delivering the crude borax at the reduction works. Seven white men and twenty-nine Chinamen are employed.

From the works the borax is hauled in waggons to Mojave a distance of 160 miles. The round trip is made in twenty days. Five teams are engaged in this work, twenty animals in each team. The wheels of the waggons are eight inches broad on the face, and the tires when new weigh 1,200 lb. One new waggon costs $1,200.—*Oil, Paint, and Drug Reporter.*

## BLEACHING STARCH WITH HYDROGEN PEROXIDE.

IT is well known that starch, completely free from gum, is of a snowy white colour. Nevertheless, for the ordinary kinds of starch it is necessary to bring a bleaching process into requisition in order to satisfy the requirements of the market.

**I. Bleaching with Hydrogen Peroxide.**—Every 1,000 kilos. of damp starch pulp, after removal of the gum and impurities as much as possible by a centrifugal machine, is mixed with 5 to 10 kilos. of hydrogen peroxide as thoroughly as possible, and then subjected to a slow drying process at a low temperature. By this means the hydrogen peroxide becomes more and more concentrated in the solution of the starch, acting most energetically upon it, but without destroying the starch. The hydrogen peroxide, when added from the outset to the starch milk, prevents the development of deleterious fermentations.

**II. Combined Bleaching with Hydrogen Peroxide.** The bleaching is undertaken in the ordinary manner hitherto adopted with chloride of lime and sulphuric acid, and after washing, the hydrogen peroxide is added according to I. By this means the greatest work is carried over to the cheap chlorine, while the last intense after-bleach falls to the hydrogen peroxide. Simultaneously the hydrogen peroxide removes the superfluous chlorine which, if allowed to dry in, exercises a disturbing action upon the composition of the starch—*Königswarter and Ebell.*

## ON THE INDIGO BATH FOR DYEING WOOL.

BY DR. BRUNO LINDENBERG.

THE present mode of working the indigo bath demands much previous practice, without which, frequently, the entire loss of the bath results. Care must, in the first instance, be taken to provide a continuous source of hydrogen, in conjunction with as much free alkali as may be necessary, to dissolve the indigo-white formed.

Up to the present time we have been using for dyeing wool the so-called woad, soda, potash, urine, and sugar baths. These kinds of bath are too well known to require a fresh description. Again, we have the so-called hydrosulphite bath recommended by Schützenberger, as also the zinc bath introduced by Leuchs. The former would hardly appear to be much used, while the latter is mainly brought into requisition as a cold bath for cottons and linens.

I will now proceed to describe a practically approved fermentation bath which I have introduced into the largest South American cloth and buckskin manufactory, viz., that of August Kaiser, at Bellavista-Tomé in Chili, (of which I am manager and director), which is quite certain in its action even in the hands of ordinary workmen, provided they are only even moderately careful. I term this bath the meal bath. It is prepared in the following manner:—15 kilos. of wheat flour are mixed with cold water and stirred up into the consistency of milk, the formation of lumps being avoided. This is then placed in the vat filled with water, heated up to 81° C., adding 6 kilos. of ground indigo and 30 kilos. of crystallised soda; the mixture is then well stirred and left to ferment, which takes place in from twenty-four to forty-eight hours. Then dyeing and stirring takes place three times daily, viz., morning, noon, and night. When necessary feeding takes place with—

3 kilos. indigo,
3 ,, meal,
6 ,, soda crystals,

at a temperature of 60° C. in the evening, so that on the following morning the dyeing temperature stands at about 62·5° C. Should it be undesirable to add any fresh indigo, the bath must nevertheless be warmed daily with 1 kilo. of flour and 2 kilos. of soda crystals, always bearing in mind that the temperature must be kept up to 69° C. Sharpening takes place in the usual manner with lime, of which, however, in no case must more than one-third of the total weight of soda be used. Where the indigos used are of very pure quality this addition of lime can be omitted.

I prefer the soda crystals to the calcined soda, for the reason that their composition is almost invariably uniform. The fermentation is, as is well known, in the primary state a lactic acid fermentation, while in the secondary stage the lactic acid becomes transformed into butyric acid, with development of hydrogen. Both processes are carried out simultaneously in the indigo bath. The spent indigo bath can be considered as a very good and cheap source of butyric acid. If starch sugar is at hand, then the same offers an excellent means of assistance in reducing the indigo. The finest pulverisation of this expensive dyestuff is, as is well known, a main condition of the composition of the bath, consequently when mashing I add to 6 kilo. of indigo 1 kilo. of caustic potash or caustic soda and 2 kilo. of starch sugar.

Again, it is of advantage to heat the pulp prior to bringing the same into the bath, by which means a complete dissolving results, even in the case of coarsely ground indigo.

Whether the famous zinc-powder bath in vat dyeing has hitherto been used in the warm process I am not able to state with certainty; but I nevertheless doubt it for the reason that the indigo white in the zinc bath disappears very rapidly, consequently the bath has to be very frequently replenished in order to provide an equal and correct supply of hydrogen. As in the case of this bath caustic alkalies have to be called into requisition, which, when used in excess, attack the wool, I thought of a method of obviating the rapid oxidation of the bath. This method is the neutral sulphite of soda.

I compose the zinc dust bath as follows:—

| | |
|---|---|
| 3 kilos. ground indigo. | 2 kilos. caustic soda. |
| 6 ,, zinc dust. | 2 ,, caustic lime. |

These are boiled together in the necessary quantity of water until the indigo is reduced; this I then place in the bath filled with water, which is heated to 62·5 C., and which is displaced with 10 litres of neutral sulphite of soda of 20° B., stirred and allowed to settle. For feeding I use,

| | |
|---|---|
| 3 kilos. indigo. | 1 kilo. caustic soda. |
| 3 ,, zinc dust. | 1 ,, caustic lime. |

5 litres sulphite of soda.

In addition to the substances cited above, to each kilo. of indigo 1 kilo. of crystallised carbonate of soda must be added.

This bath acts very well; never spoils, while it can be interrupted at any time.

(The improvement mentioned by the author of the zinc bath is a modification of Schützenberger's hydrosulphite bath. So far as we know the latter has been practically used in a large dyeworks in the Vosges).—*Chemiker Zeitung.*

## A NEW INDUSTRY FOR NORTH SHIELDS.

NORTH SHIELDS will soon be able to boast of a new industry within its boundaries. Messrs. W. S. Corder and Co., about nine weeks ago, commenced erecting a manufactory for converting fish refuse (including also butchers' refuse) into a fine manure, of the nature of Peruvian guano. The works are situate within the tannery establishment of Messrs. J. R. Proctor and Son, Low Lights, and at present cover about one acre of ground. The machinery intended to be used for the purpose, and which is nearly fixed, consists of Johnson's patent drying pans. These are already in use in various parts of the kingdom—notably at Belvedere, in Kent, where the whole of the vast refuse of the London fish markets is treated, the drying being produced by steam, and the work carried on in such a way as to remove all the possibility of nuisance to the inhabitants who may reside in the locality. Indeed, the absence of smell and the comparative noiselessness of the machinery are such as to almost remove beyond the scope of belief that any important manufacturing process is being carried on. To satisfy the requirements of the Sanitary Committee of the Corporation, Messrs. Corder have laid down costly and extensive deodorising and disinfecting plant for the purpose of effectually treating and checking all noxious fumes that may be generated; and it is averred by the firm that no more complete plant of the kind can be found throughout the kingdom, the manufacturers of which are Messrs. Manlove, Alliott, Fryer, and Co., Nottingham. In connection with the principal business, it is intended to carry on the manufacture of cod liver oil for medicinal purposes, and in course of time the firm hope to introduce several chemical industries. The establishment will be under the personal superintendence of Mr. W. S. Corder, who has for some time been resident in North Shields as a chemist, and who has gained a high reputation in branches of scientific chemistry. At present the firm look to Yorkshire as the chief market for the manufactures which they are about immediately to undertake, the greater proportion of which will be conveyed by sea. It has been the custom, it may be added, in North Shields, for some years past, to send a portion of fish refuse to Berwick and other places; but now that this new industry has been introduced into the borough of Tynemouth by Messrs. Corder, distant markets will be no longer troubled. We may state that the principal butchers in the town have already been supplied with barrels, etc., for the reception of bullocks' blood and other refuse, which will be emptied at the manufactory so many times during each week. Hitherto cods' livers have been despatched from North Shields to Hull for the purpose of being used in the manufacture of cod liver oil; but now a market is to be provided at home for such.

## THE USE OF CHLORIDE OF ANTIMONY FOR FIXING COLOURS DERIVED FROM TAR.

LATTERLY there has been proposed for this purpose various substances as substitutes for tartar emetic, double oxalate of antimony and of potash, for the solution of oxide of antimony in glycerine and glucose, etc. Chloride of antimony was rejected in the majority of the applications that had been tried in consequence of its too easy precipitation in the presence of water. This defect disappears when the chloride of antimony is in the form of double-salt, whether of sodium or of magnesium, and according to the author, this seems to absolutely fulfil the desired end. The formula of the bath which he recommends when making use of the ordinary chloride of antimony of commerce is as follows:—

| | |
|---|---|
| Water ... ... ... ... ... ... ... ... | 45 litres. |
| Common salt ... ... ... ... ... ... | 14 kilogs. |
| Chloride of magnesium crystallised | 9 ,, |

Should it be desired to eliminate the salt, the proportion of chloride of magnesium should be raised to 28 kilogs. for every 45 litres of water.

The advantages which chloride of antimony present over tartar emetic consist not only in the diminution of cost, but in the great facility with which the fixing by the chloride process is attained on cottons prepared with tannin. The tannate of antimony is insoluble in salt solutions, while it does not produce accidental removals of lac, inasmuch as the precipitation is complete. As, in proportion to its use, the bath becomes acidified, it is desirable to dilute it progressively

with water, with the view of removing the acidity in part. By the aid of this expedient the baths can be completely exhausted, and, after having neutralised them by means of an alkali the residues of chloride of sodium and magnesium can be used again for fresh baths by adding the necessary proportion of chloride of antimony.—*L'Industrie Revue Technique.*

## ON THE USE OF FLUORCHROME IN DYEING WOOL.

BY H. LANGE.

THE fluorchrome manufactured by the firm of Rudolph, Koepp and Co., in Austria, can in many instances be advantageously used in the place of acetate or nitrate of chrome for steam dyeing. According to experiments made by the author, this salt offers great advantages also in dyeing wool in the place of chromate of potash. The colours obtained by the use of fluorchrome are very bright and rich. The wool which has been impregnated with it obtains a lightish green appearance, owing to the direct precipitation of the chrome oxide upon the fibres, while with chromate of potash the wool becomes yellow to greenish, in accordance with the duration of the boiling. If it becomes green, then most decidedly an oxidation of the fibres has taken place, simultaneously with a reduction of the chromic acid to chrome oxide, from which it is explained why the wool invariably becomes somewhat rougher and harder under this treatment. The quantity of the dye fixed appears, when using fluorchrome, to stand in direct proportion to the strength of the bath employed, which is not always the case when chromate of potash is used.

Woollen yarn, which has been saturated for a lengthened period in fluorchrome, does not show the least tendency to felting, remaining very soft, so that, on the whole, no unfavourable action can be ascribed to this salt upon woollen yarns and colours. The saturated wool becomes easily soaked in the colour bath and the colour baths are well spent. For instance, cloths are more regularly and perfectly dyed through with alizarine blue than by a boiling with chromate of potash. As copper becomes strongly attacked by fluorchrome, the boiling must consequently be effected in wooden vessels.

Again, fluorchrome can in many cases be used with advantage where chromate of potash is not available, on account of its oxidising tendencies. For instance, where it has hitherto been impossible to colour wool previously dyed with indigo with a chromate of potash boiling without any sensible loss of indigo, this process can be easily carried through with fluorchrome without in any way injuring the indigo ground. Consequently, fluorchrome should be in favour, more especially in those cases where a beautiful and pure colour is desired, as also in those instances where the goods are dyed through with difficulty, forming a successful substitute for chromate of potash.—*Leipzig Journal of Textile Industries.*

## THE OPL AND MILLER AND OPL PROCESSES.

THE *Chemische Industrie*, in its issue of August last, contains an article by M. Hasenclever upon the present situation of the manufacturers of Leblanc soda in their competition with ammonia-soda, in which we notice the indication of the two following processes.

It is more than fifty years ago that Gossage recognised that carbonic gas decomposed the sulphide of calcium with the formation of $H^2S$ and $Ca\,CO^3$. In the year 1837 he took out a patent for this by a process consisting of displacing $H^2S$ of the residues by carbonic gas and utilising this sulphuretted hydrogen for the production of sulphuric acid.

In the same manner Opl displaces the sulphuretted hydrogen by carbonic acid; but he interrupts the operation as soon as the unattacked sulphuret of calcium becomes transformed into sulphohydrate by the displaced sulphohydric acid.

This process, when worked out in the laboratory with pure carbonic gas, appears to be entirely applicable to the great industry. But when the author of this article had attempted to put it in practice in the Stolberg Works, employing carbonic acid from lime furnaces, it was found that the oxidising action of the air troubled the reactions to so great an extent as to render the process impracticable. However, the gases employed contained 27 per cent. in volume of carbonic acid, and between 0·5 and 1·3 per cent. of oxygen. Side by side with the polysulphides, hyposulphites were formed, when only sulphohydrate of calcium was sought to be obtained.

A process which would have a greater chance of success is that which H. V. Miller and C. Opl have patented. According to these authors soda waste is treated with sulphuretted hydrogen gas, and the sulphohydrate of calcium obtained is decomposed by steam into hydrate of lime and sulphuretted hydrogen.

The reaction—

$$CaS + H^2S = CaSH^2S$$

has been known for a long time. The second reaction—

$$CaSH^2S + 2H^2O = CaOH^2O + 2H^2S$$

has been discovered by the authors of the process; it is, besides, in complete contradiction to classical doctrine.

The process of V. Miller and Opl will soon be attempted on a large scale at the Stolberg works. If its promises are fulfilled then a great advantage will result for the Leblanc process.—*Chemiker Zeitung.*

## CHEMICAL PROCESSES WHICH TAKE PLACE WHEN DYEING WOOL AND SILK WITH BASIC TAR COLOURS.

BY EDW. KNECHT.

THE quantitative experiments which have been carried out by the author, directly contradict the mechanical theory, according to which, when dyeing wool and silk with basic tar colours the dye becomes simply absorbed in an unaltered form by the fibre (yarn). Wool has been boiled in a solution of 0·2 grm. of crystallised fuchsine in about 500 c.c.m. of water, until the colour has been completely removed from the solution. The fluid which remained reacted neutrally, and contained ammonia. The quantity of hydrochloric acid originally contained in the fuchsine used amounted to 0·01630 grm., while the hydrochloric acid which remained behind in the solution amounted to 0·01622 grm. In a similar manner a treatment was made with 0·2 grm. crystallised chrysoidine. The quantity of hydrochloric acid contained in the chrysoidine was 0·02446 grm., while, after removing the colour, 0·02476 grm. was found in the solution. A similar result was arrived at when using crystal violet, as also when dyeing silk with fuchsine and crystal violet.

In the first place, these experiments prove that the dyeing of animal fibres with basic colouring matter does not depend upon a simple mechanical absorption, but upon a chemical transformation. This view is further supported by the fact that the fluid remained neutral (the salt acid had become united with the ammonia, and probably also with other basic bodies which are formed during the partial decomposition) and that wool can be dyed an intense fuchsine red in the colourless watery rosaniline solution without the presence of acid at all.

The question as to the nature of the combinations which become formed upon the fibre when dyeing with basic colouring matter must for the time being remain unanswered. It would be possible that these colouring matters during the dyeing process become united with the carboxyl groups contained in the keratine or in the fibroine, forming an insoluble lake, or at least one difficult to dissolve; while, when dyeing with acid colouring matter, the dye acid becomes united with the amido group of the keratine or fibroine, and in this manner forms another kind of coloured lac.—*Chem. Soc. of Berlin.*

## STEAM BOILER INCRUSTATION.

ANYTHING which will prevent the corrosion and incrustation of boilers is an invaluable invention. A Cardiff engineer has patented a process which he terms the "Alterion." It consists of *(a)* a battery outside boiler, and fixed in engine-room or other convenient place; *(b)* electrode of metal or other conductor of electricity insulated within the boiler, and connected to the battery by means of a wire which is well insulated as it passes through the boiler shell; *(c)* a commutator placed in the circuit to change the direction of the currents periodically, and worked off any suitable part of the engine; *(d)* a galvanometer, also placed in the circuit, so that the engineer in charge can see at once if everything is working properly. The battery is made in three sections, so that whilst one section is in action the

other two are at rest, a switch being provided for that purpose. The current is sent in alternate directions; in passing in one direction it decomposes the water and deposits hydrogen on the boiler plates, and in passing in the other direction it reforms the hydrogen into pure water, thus keeping a layer of pure water all round the boiler shell and tubes, which eventually prevents the deposition of scale. In these actions are also formed it is stated small quantities of hydrogen-dioxide and ozone, which not only protect the boiler, but tend to reduce the rust already existing to metallic iron.

# Correspondence.

## ANSWERS TO CORRESPONDENTS.

FERRUM.—The subject is scarcely suitable for our readers.

J. C. J.—The separation of tin from antimony is not difficult to an experienced analyst, but great care is required.

J. P.—We should be pleased to stitch our Journal, but unfortunately the Postal Regulations will not allow it to be done.

H. D.—We shall be pleased to see you when you are this way.

H. H. C.—The patent is certainly invalid, and we would advise you to have nothing to do with it.

TARTAR.—We believe the idea is to turn the affair into a limited company as soon as those who carry it on have squeezed it sufficiently.

F. S. & Co.—We thank you for your letter. We have received several communications from those of our subscribers who are engaged in dyeing, bleaching, and calico printing, asking us whether we could not occasionally insert articles more immediately concerning these industries. We have well considered the matter, and have pleasure in intimating that we have made arrangements to publish an article or two each week bearing upon the chemistry of the above subjects, so that we hope our efforts in this direction will be appreciated. We are pleased to find that our market reports and the prices current have given satisfaction, several firms when renewing their subscriptions having written us to say that the information given in our Journal has saved the amount of their subscription many times over.

*** *We do not hold ourselves responsible for the opinions expressed by our correspondents.*

## TECHNICAL EDUCATION.

*To the Editor of the Chemical Trade Journal.*

Sir,—All who are interested in the future welfare of our native industries must welcome the indications of a general awakening to the need for improved technical education; and the speeches of the Prime Minister and Lord Rosebery at the Mansion-house the other day are proof that our legislators, equally with the people, are prepared to give the question their best practical consideration. But while we are distributing vast sums for the formation of technical schools which shall turn out a race of superior workmen, are we not in danger of forgetting that, with the higher standard of skilled labour, we must also insure a higher degree of knowledge among the masters?

Now the educational machinery and appliances which are required to give the improved instruction for the rising generation of masters will surely be proportionately higher than those which suffice for the more elementary education of the men; and the former are as much beyond the reach of the one class as the latter are of the other. I would venture to suggest, then, that any scheme which deals with the one subject without grappling with the other is incomplete; for both classes are alike in need of assistance, and in common fairness deserve equal consideration.

It is true that there are many colleges (such as King's and University Colleges) in London and the provinces, which, as far as their limited means will permit, have been doing the work which is so needful; and others, like the City and Guilds Central Institute, with a larger measure of financial aid, have recently entered on the same field. I would urge that the simplest method of dealing with the matter would be to utilise the existing machinery of these accredited institutions, and by more liberal endowment to enable them to extend their sphere of usefulness to a corresponding degree.
—I am, etc., FAIR PLAY.

## THE CONTINUED DEPRESSION IN TRADE.

*To the Editor of the Chemical Trade Journal.*

Sir,—A great many theories have recently been advanced to account for the depression in trade, which has extended over the last ten years, and which has puzzled political economists to unravel. One clue to the solution of the difficulty is to be found in the fact that, so far as Britain is concerned, countries that were a few years ago our customers are now our competitors, and by their own productions are now shutting us out of their markets. Nations that were formerly specialists and confined themselves to industries of a class are now becoming more miscellaneous in their manufactures, and are producing for themselves articles they formerly purchased. This is specially the case during the last twenty years. In Russia, for example, manufactures have more than quadrupled since 1861, while in Germany cotton and woollen goods have been doubled, and the Fatherland is second only to France in silkmaking. Austria and Hungary are also entering the field, and Italy has doubled the production of her looms in four years and trebled the number of her spindles in eight. Our great Indian possessions no longer depend upon us entirely for their cottons, as, since 1860, the number of her spindles has been more than doubled, and her looms will almost bear to be multiplied by eight. These are concealed factors in the depression of trade, and prove how rapidly the manufacturing trade is springing up in new places. The disposition in nations now to become their own manufacturers is thus apparent, and is continuously and surely lessening the number of foreign markets. The lesson from all this is, that nations will in future have to confine themselves more to the home markets than formerly, and seek some other means, by emigration or otherwise, of disposing alike of their surplus population and surplus goods.
Your insertion will oblige.—I am, etc., JAS. HUNTER.

## SULPHUR MINES IN SICILY.

REPORT OF PHILIP CARROLL, U.S. CONSUL AT PALERMO.

SULPHUR, or brimstone, is a hard, brittle substance of various colours, from brilliant yellow to dark brown, without smell when cool, of a mild taste, and burns with a pale blue flame, emitting pungent and suffocating fumes. Its specific gravity is from 1·9 to 2·1.

Sulphur exists more or less in all known countries, but the island of Sicily, it is thought, is the only place where it is produced on a large scale, and consequently that island appears to command the market. Small quantities have been found in the north of Italy, the Grecian Archipelago, Russia, Austria, Poland, France, Spain, eastern shores of Egypt, Tunis, Iceland, Brazil, Central America, and the United States. Large quantities are said to exist in various countries of Asia, but it is understood to be impracticable to utilise the same, consequent upon the distance from any commercial port, and the absence of rail or other roads.

Sulphur is of two kinds, one of which is of volcanic emanation, the other being closely allied to sedimentary rocks. The latter is found in Sicily, on the southern and central portions of the island. Mount Etna, situated in the east, seems to exert no influence in the formation of brimstone. There are various hypotheses relative to its natural formation. Dr. Philip Swarzenburg attributes it to the emanations of sulphur vapour expelled from metallic matter existing in the earth, consequent upon the fire in the latter, while Professors Hoffman and Bischoff ascribe it to the decomposition of sulphuretted hydrogen. Hoffman believes the sulphuretted hydrogen must have passed through the fissures of stratified rocks, but Bischoff is of opinion that the sulphuretted hydrogen must have been the result of the decomposition of sulphate of lime in the presence of organic matter. The theory of others is that sulphur owes its origin to the combination of lacustrine deposits with vegetable matter, and others again suppose that it is due to the action of the sea upon animal remains. The huge banks of rock salt often met with in the vicinity of sulphur mines, and which in some places stretch for a distance of several miles, seem to indicate that the sea has worked its way into the subsoil. Fish and insects, which are frequently found in strata of tripoli, which lie under sulphur beds, induce the belief that lakes formerly existed in Sicily.

The following is a list of the various strata which form part of the crust of the earth in Sicily, according to Professor Mottura, an Italian geologist:—

*Pliocene.*—Sandstone; coarse calcareous rock; marl.

*Upper Miocene.*—Calcareous marl; gypsum, etc.; sulphur embedded in calcareous limestone; solicitous limestone; tripoli, containing fossils of fish, insects' eggs, etc.

*Middle Miocene.*—Sandstone, containing quartz, intercollated with marl of a saltish taste.

*Lower Miocene.*—Rock salt; blue marl, containing petroleum and bitumen; flintstone; ferruginous clay, mixed with

aragonite and bituminous schists; ferruginous and selicious sandstone.

*Eocene.*—Limestone, containing diaspores and shells.

At times one or another of the strata disappears, while the order of some is slightly reversed on account of the broken state of the crust. Upon the whole, however, the above has been generally observed in the various mines by the author referred to.

Sulphur mines have been operated in Sicily over three hundred years, but until the year 1820 its exportation was confined to narrow limits. At present the number of mines existing in Sicily is about three hundred, nearly two hundred of which, being operated on credit, are, it is understood, destined to an early demise. It is said that there are about 30,000,000 tons of sulphur in Sicily at present, and that the annual production amounts to about 400,000 tons. If this should be true, taking the foregoing as a basis, the supply will become exhausted in about seventy-five years.

*(To be continued.)*

# Market Reports.

## WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

With scarcely an exception the tendency during the week has been to the fall, soda crystals alone favouring sellers' desires in the matter, and the bulk of business put through overhead has been under the average. Bichromates, however, find themselves in a slightly improved inquiry, and during the week dispatches from the works have been coming up to the former average, although that point has not yet been quite attained. Scotch dyers are all more or less slack, with a corresponding effect upon the market for dyeing chemicals. Bleachers are not so bad, and the local demand for bleaching powder is pretty fair, with former prices maintained at least. To-day the idea for sulphate of ammonia is £11. 10s. top price spot delivery, or slightly less appreciative than it was a week ago, but there is little doing, and still less for forward, which is nominally quoted at about £11. 12s. 6d. Paraffin oil (burning) will probably have its price for the year fixed by the makers this week. Some favour a rise of a halfpenny a gallon, but the likelihood is that no change will be made. The other paraffins are all as before, depressed. General prices current are:—Soda crystals, 42s. 6d. net Tyne; alum in lumps, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid £41, net Glasgow; soda-ash, 48/52°, 1d., less 7½ % Tyne; caustic soda, white, 76°, £8. 5s., 70/72° £6. 12s. 6d., 60/62° £5. 13s. 9d., and cream, 60/62°, £5. 13s. 9d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £4. 15s., and 1 cwt. casks, £5 net Tyne; refined alkali, 48/52°, 1½d., less 2½ % Tyne; saltcake, 20s., less 2½ % f.o.r. Glasgow; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 % f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 % to Scotch and English buyers respectively; nitrate of soda, 9s. 4½d.; chlorate of potash, 5½d., less 5 % any port; sulphate of ammonia, £11. 10s. f.o.b. Leith; sulphate of copper, £20. 10s.; paraffin scale, hard, 2 1/16d., soft 2d.; paraffin wax, 120° semi-refined, 2 1/16d.; paraffin spirit, 4½d.; paraffin oil (burning) 5⅜d. to 6d., and lubricating ditto, 865°, £4. 10s. to £4. 15s., 885° £6, and 890/95° £7. 10s. to £7. 15s. Greenock sugar imports have been very moderate, running to 12,708 bags only.

## THE LIVERPOOL MINERAL MARKET.

Our market has continued firm during the past week. Manganese: Arrivals have been small, and there is no alteration to report in prices. Magnesite (containing 98 per cent. of carbonate of magnesia) unaltered at 30s. to 35s. for raw lump; raw ground, £6. 10s., and calcined ground, £10 to £11. Bauxite (Irish Hill brand): Largely increased sales have been made at full prices; 20s. for lump; seconds, 15s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk continues to sell freely, bringing full prices, especially best brands—90s. for medium, and 95s. to 100s. for best GGB. Barytes (carbonate) continues in good demand. Selected crystal lump scarce at £6. 5s.; No. 1 lumps, 90s.; best lumps, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate steady; best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone steady at the advanced prices—ground, at £8; specially selected lump, finest quality, £11. 10s. Iron ore unaltered; Bilbao and Santander, 7s. 9d. to 8s. f.o.b.; Irish, 10s.; Cumberland, 8s. to 12s. Purple ore, 6s. Spanish manganiferous ore, 18s. to 20s. c.i.f. for forward delivery. Emerystone in improved demand, especially for best brands—£5. 5s. to £5. 15s. for lump; and smalls, £5. Fullers' earth steady, 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda quiet. Tungsten metal at 2s. 6d. per lb. Chrome metal, 5s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore continues to be inquired for at last prices. Antimony ore continues firm; £16 to £22. for fair quality. Antimony metal unchanged. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potters' lead: Smalls, £11. 10s. to £12; selected lump, £13 to £14. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 17s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar: 45s. for ground. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; Italian and Bohemian, £4 to £12. per ton. French sand, in cargoes, 16s. to 17s. Ferromanganese: 80 per cent. packed, £11. 2s. 6d.; 70 per cent. packed, £10; 60 per cent. packed, £8. 16s.; 50 per cent. unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. Spiegel, 20 per cent., £4. 12s. 6d. Silicon spiegel, 9 per cent., £8. Chrome pig, 10 per cent., £8. 10s. to £10. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8. Ground mica, £50. China clay: Common, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn). Irish moss: Common, £9; medium, £10 to £11; best, £12 to £13.

## LIVERPOOL CHEMICAL MARKET.

There has been more inquiry during the week, but there is no improvement to report in prices. Soda-ash 1d. up. Caustic soda: 60 per cent. white, £5. 17s. 6d.; 60 per cent. cream, £5. 15s.; 70 per cent. white, £6. 15s. to £6. 17s. 6d.; 74 per cent., £7. 10s.; 76 per cent., £8. 5s. to £8. 7s. 6d. Bicarbonate, £6. 10s. Nitrate of soda, 9s. 6d. to 10s. Soda crystals, £2. 15s. Silicate of soda: Brown lump, £6. 15s.; green lump, £5. 7s. 6d.; 100° solution, £4. 17s. 6d.; and 75° solution, £3. 12s. 6d. Bleaching powder, £7. 10s. to £7. 12s. 6d. for hardwood, and £7. 5s. softwood. Saltcake, 21s. to 22s. Bichromate of potash, 4¾d. Bichromate of soda, 3½d. Carbonate of potash, £18 to £20. Chlorate of potash, 5½d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 21s. to 23s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £12. 5s. to £12. 10s., strong; lump, little offering. Saltpetre: Crystals, 23s.; ground, 26s. Sulphur: Roll, £6. 15s.; flour, £9. 5s.; best thirds, £4. 10s. Sulphate of copper quoted at £23. Blanc fixe, £8. 10s. Manganese: Sulphate, £16 to £17; chloride of manganese, £20 per ton; carbonate, £12. 10s.; borate, best English make, 6d. Hydrate of alumina, £24. 10s. Precipitated carbonate of magnesia, 50s. Chloride of magnesium (antiseptic) strong, at 45s. to 50s. Chloride of calcium, 50s. Epsom salts, 70s. to 75s. Muriate of ammonia: White, 22s. Refined borax, 30s. Verdigris, 1s. per lb. Acetate of lime, £12. 5s. Bisulphide of carbon, £15. Chloride of sulphur, 7d. to 8d. per lb. Montreal potashes, 23s. Pearl ashes, £2. 3s. Chloride of zinc (solid) £18.

## THE LIVERPOOL COLOUR MARKET.

Colours unchanged. Ochres: Oxfordshire is quoted £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55.; seconds, 47s. 6d.; and common, 18s.; Irish, Devonshire, 40s. to 45s.; French, J.C., 45s., 55s., to 60s. M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £21. 10s. to £22. Red lead, £19 to £20. Oxide of zinc: V.M. No. 1, £19.; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 10s. 9d.; black, 10s.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto for jewellers, 1s.

per lb. Drop black, 25s. to 28s. 6d. Oxide of iron, prime quality, £10 to £15. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermillionette, 10d. per lb.

## MISCELLANEOUS CHEMICAL MARKET.

Prices generally are without change. There has been some slight improvement in bleaching powder, and nearest value on rails at works is now £7. 6s. 3d. per ton. Soda-ash continues to find steady sale at current rates, both for prompt and forward delivery, the latter principally for export trade. Caustic soda does not improve in price, and saltcake will need to recede some shillings per ton if present prices are to pay. Soda crystals are unchanged. For chlorate of potash there is rather better inquiry. Sulphate of copper is quoted £20. 10s. to £21. Acetates and nitrate of lead are much depressed. Brown acetate of lime is again lower, and acetate of soda is more freely offered at lower prices. Carbolic acids are in small demand for the season of the year, and prices are weak. Crude carbolic can be bought at 3s. 8d. per gal. Prussiate of potash is difficult to sell, and foreign brands can be bought at low prices. Sulphocyanides are without change in price, but demand is small. Ammonium chloride, carbonate, and nitrate maintain their value at current list prices. Potash, carbonate, and caustic, are firm.

## METAL MARKET REPORT.

The movements in this market during the past week have been irregular. Iron has been steady, although on Tuesday the Glasgow market was flat at 37s. 10d.; the closing however is better at 38s. o½d.; still at the moment the outlook is not hopeful, and higher prices cannot be looked for with the heavy increasing stocks. Tin during the week has fallen from £79. 5s. to £75. 7s. 6d., and is still weak. Copper has also been unsteady, smelters having reduced their prices and consumers still holding off, the press and the public regarding the position of the syndicates as precarious, and believing that a collapse may occur in this metal similar to that which occurred in tin. No one who can avoid doing so buys copper at present. Silver has improved from 42d. to 42 3/8d. Lead is a little firmer at £12. 5s., whilst spelter has declined from £15. 10s. to £15. Quicksilver unchanged at £7. 14s. General conditions tend to favour the market, the distinct rise in foreign stocks and English railways indicating that the political conditions afford confidence, and that the trade prospects are brighter.

## THE TAR PRODUCTS MARKET.

Slackness and absence of demand for benzol continues to reign supreme in this market, with the result that 50/90's has fallen to 2s. 3d. d/d London, which is equal to 2s. 1½d. f.o.b. Goole or Hull. Solvent naphtha is a trifle weaker though there is a fair demand for this article. A rumour is current that the Government has bought up the picric explosive patents, and on this account some makers are holding to carbolic acid rather than offering it for forward. For July-December, 3s. 4d, has been offered for 60's, but we believe not accepted. Anthracene remains *in statu quo*, there being no buyers at present. Pitch remains, as stated in our last prices current, at 13s. Garston, and it is very doubtful whether the higher prices said to have been obtained recently were *bond fide*.

## THE SULPHATE OF AMMONIA MARKET.

The absence of orders in this market makes it difficult to fix the value. In fact there are no buyers at the present moment, and every parcel that is offered tends to bring down the price to a level that will make speculation profitable. A fair quantity is being shipped however, but this is not the result of any very recent business. Beckton price is £11. 15s., but we hear that some quantity has been sold on Beckton terms at £11. 7s. 6d. At Hull business has been done at £11. 12s. 6d. to £11. 11s. 3d., while Liverpool and Leith quotations stand at £11. 10s. 0d. Buyers are holding off in the expectation of seeing lower prices, but stocks are still low, and there is no inordinate quantity pressing on the market.

# New Companies.

F. Joyce and Company Limited.—This is the conversion to a company of the business of sporting and military ammunition manufacturers, carried on by Messrs. F. Joyce and Company, at Waltham Abbey, Essex, and 57, Upper Thames-street. It was registered on the 6th inst., with a capital of £60,000 in £1 shares, with the following as first subscribers:—

| | Shares. |
|---|---|
| Wm. Brown, 3, Waltham-lane, Waltham-cross, machine tool maker | 1 |
| R. C. Courtman, Waltham-cross, foreman engineer | 1 |
| H. Jackson, Waltham-cross, clerk | 1 |
| T. Rosewell, Enfield, mechanical engineer | 1 |
| A. J. Sapsworth, Waltham-cross, engineer | 1 |
| G. Smith, Waltham-abbey, engineer | 1 |
| J. Wigney, Waltham-cross, engineer | 1 |

Greenwood Tea Company Limited.—This company was registered on the 18th inst., with a capital of £60,000 in £20 shares, to acquire the tea estates known as Greenwood, Dinjan, and Blackburn, situate in district of Luckhimpore, and sub-district of Deebrooghur, province of Assam, India. The subscribers are:—

| | Shares. |
|---|---|
| D. MacNeill, 50, Old Broad-street, merchant | 1 |
| J. Mackinnon, Old Broad-street, merchant | 1 |
| J. Davidson, 11, Waring-street, Belfast, merchant | 1 |
| H. Macneish, Campbeltown, N.B., tea planter | 1 |
| C. Reiner, 50, Old Broad-street, merchant | 1 |
| S. MacLeary, 50, Old Broad-street, merchant | 1 |
| H. C. Agnew, Sahnraer, N.B., merchant | 1 |

H. Spicer and Company Limited.—This is the conversion to a company of the business of paper manufacturers, carried on by H. Spicer and Co., at Cattershall Mills, Godalming, and the business of an agency for the sale of paper carried on by Mr. Herbert Spicer, at 165, Queen Victoria-street. It was registered on the 15th inst., with a capital of £150,000 in £10 shares. The subscribers are:—

| | Shares. |
|---|---|
| F. W. Layzell, 87, Bartholomew-road, N.W., clerk | 1 |
| J. S. Greenwood, 48, Torriano-avenue, N.W., shorthand writer | 1 |
| C. R. Roberts, 229, Holloway-road, book-keeper | 1 |
| E. S. Dane, 3, Ruby-street, Old Kent-road, clerk | 1 |
| W. C. Andrews, 19, Thornsett-road, Annerley | 1 |
| A. Crook, Sutton, Surrey | 1 |
| C. F. Culver, 26, Edric-road, New Cross, clerk | 1 |

J. and J. Charlesworth Limited.—This company proposes to take over the business of Messrs. J. J. Charlesworth, colliery owners, etc., carried on at Lofthouse, near Wakefield. Power is also taken to carry on business as electricians and mechanical engineers. It was registered on the 14th inst., with a capital of £500,000, in £100 shares, the following being the first subscribers:—

| | Shares. |
|---|---|
| A. H. Charlesworth, Chapelthorpe, colliery owner | 1 |
| J. B. Charlesworth, Wakefield, colliery owner | 1 |
| Mrs. E. B. Charlesworth, Wakefield | 1 |
| J. Charlesworth, Lofthouse, Wakefield, colliery owner | 1 |
| C. E. Charlesworth, Doncaster, colliery owner | 1 |
| Mrs. F. Charlesworth, Doncaster | 1 |
| Mrs. E. G. Charlesworth, Wakefield | 1 |

Langford Manganese Company Limited.—This company proposes to acquire land and hereditaments at Langford, parish of Newton, St. Cyres, Devon, and to mine for manganese and other minerals. It was registered on the 15th inst., with a capital of £10,000, in £1 shares. The subscribers are:—

| | Shares. |
|---|---|
| G. Worth, 20, Liverpool-street, printer | 1 |
| C. A. Pilcher, 29, Crodey-hall-chambers, stockbroker | 1 |
| J. G. Brotheridge, 52, Queen Victoria-street, contractor | 1 |
| R. J. Popplewell, Romford | 1 |
| J. R. Swan, Wool Exchange, oil merchant | 1 |
| A. C. Bird, 26, Bernard-street, W.C., clerk | 1 |
| R. M. Taylor, 11, Keppel-street, W.C., clerk | 1 |

Patent Gas Producer Syndicate Limited.—This syndicate was registered on the 18th inst., with a capital of £2,000 in £1 shares, to enter into an agreement of 14th inst., with Henry Thomas Staines and Company, manufacturers patent gas producers. The subscribers are:—

| | Shares. |
|---|---|
| J. C. Hersey, C.E., Preston-park, Brighton | 1 |
| G. W. Hersey, 70, Oxford-street, gas engineer | 1 |
| S. Hersey, 70, Oxford-street, gas engineer | 1 |
| H. T. Stanes, 5, Laurence Pountney-lane, merchant | 1 |
| A. J. Chapman, 5, Laurence Pountney-lane, secretary | 1 |
| F. C. Lefroy, 15, George-street, Mansion House, solicitor | 1 |
| H. Hanson, Havelock House, Lewisham-road, S.E. | 1 |

Tonbridge Sanitary Steam Laundry Company Limited.—This company was registered on the 13th inst., with a capital of £3,000 in £2 shares, to carry on, at Tonbridge, the business of a steam laundry company. The subscribers are:—

| | Shares. |
|---|---|
| Major-General C. B. F. Penny, Tonbridge | 1 |
| Captain W. T. Croft, Tonbridge | 1 |
| W. W. R. Cunliffe, Hadlow Castle, barrister | 1 |
| G. Stuning, Tonbridge, solicitor | 1 |
| B. H. Bartrum, Tonbridge, brewer | 1 |
| F. E. East, Tonbridge, draper | 1 |
| C. J. Morrison, Wanton, Tonbridge, tutor | 1 |

# The Patent List.

*The following List has been compiled expressly for* The Chemical Trade Journal *by G. F. Redfern and Co., Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels:—*

APPLICATIONS FOR LETTERS PATENT.

**Utilising the Residues from Starch, Glucose, Dextrine, and Alcohol** A. G. Wass. 8766. June 15.
**Smoke Combustion.** W. Fraser. 8782. June 15.
**Consolidating Scrap Metal.** R. Evans. 8783. June 15.

**Printing Designs on Celluloid.** E. T. Wood. 8786. June 15.
**Controlling the Supply of Liquids.**—(Complete Specification.) G. S. Neu. 8812. June 15.
**Candle-making Machines.** J. M. Storrar. 8823. June 16.
**Crushing and Mixing Mortar.** E. Chatham. 8831. June 16.
**Extinction of Fires.** W. W. Smith. 8837. June 16.
**Discharging Excess Chlorine from Paper Pulp.** A. Boake and F. G. A. Roberts. 8840. June 16.
**Consuming Smoke.** J. E. Hall. 8852. June 16.
**Blowing Engines.** C. J. Galloway and J. H. Beckwith. 8854. June 16.
**Measuring Liquids.** W. Willis, J. Smith, and W. Smith. 8858. June 16.
**Treating Metals.**—(Complete Specification.) G. W. Gesner. 8862. June 16.
**Treatment of Rheumatics.**—(Complete Specification.) E. W. Görnberg. 8868. June 16.
**Keeping Meat Cool in Hot Weather.** T. H. Wyatt. 8874. June 18.
**Cement Machinery.** T. C. Fawcett and T. Castle. 8879. June 18.
**Treating Fibrous Plants.** J. Russell. 8880. June 18.
**Gas Burners.** J. Bennett. 8894. June 18.
**Printing on Celluloid Substances.** A. J. Boult. 8904. June 18.
**Disinfecting Clothes.** A. Dowling. 8907. June 18.
**Manufacture of Compressed Gunpowder.** C. W. Curtis and W. J. Brown. 8916. June 18.
**Improvements in the Manufacture of Dyestuffs.** A. Bang. 8922. June 19.
**Improvements in the Manufacture of Metals.**—(Complete Specification.) R. P. Wilson, F. J. Wall, F. A. Thurston, T. L. Bibbins, and W. L. Flanagan. 8925. June 19.
**Preparing Wool Rags for Carbonising.** G. Tolson. 8934. June 19.
**Bicarbonate of Soda by the Ammonia Process.**—(Complete Specification.) M. R. Wood. 8958. June 19.
**Depositing Metals from their Salts.** W. H. Beck. 8961. June 19.
**Brick and Tile Manufacture.** W. Sayer. 8963. June 19.
**Baths for Electro-plating and Electrolysis.** E. Hopkinson and D. Appleton. 8966. June 19.
**Hank Dyeing Machines.** A. Rhodes and A. Crowe. 8967. June 19.
**Machines for Distributing Fertilising Agents.**—(Complete Specification.) L. Fehrmann and J. Klug. 8981. June 19.
**Treatment of Smoke.** S. Elliott. 8973. June 19.
**Facilitating the Use of Laundry Blue.**—(Complete Specification.) H. H. Lake. 8976. June 19.
**Treatment of Paper to Render it Waterproof.** C. D. Arie. 8981. June 19.
**A Liquid Meter.** W. Key. 8982. June 19.
**Treatment of Timber for Preservative Purposes.** J. Wilson. 8987. June 19.
**Artificial Cork.** E. Langen. 9000. June 19.
**Improvements in Floor Covering.** H. Berkeley. 9006. June 19.
**Agitating Apparatus for Ice-making Tanks.** M. C. Bannister. 9023. June 20.
**Liquid Hydrocarbon Motors.** E. Butler and T. I. Cammell. 9028. June 20.
**Treating Hide or Skin to obtain Gelatinous Matters.** F. W. P. Swinborne and L. P. Swinborne. 9033. June 20.
**Concentrated Food.** J. M. Clark. 9043. June 20.
**Dyeing or Painting on Fabrics.** C. Dratz and H. Dratz. 9044. June 20.
**Taps for Liquids.** G. F. Webb. 9058. June 21.
**Valves of Indiarubber and other Material.** J. Thompson and J. T. Hailwood. 9060. June 21.
**Hydrocarbon Motor Engines.** W. P. Theermann. 9062. June 21.
**Household and Toilet Soaps.** F. Wheen. 9089. June 21.
**Anti-Fermentation.** J. A. Muller. 9091. June 21.
**Manufacture of Vegetable Fibre from Wood.**—(Complete Specification.) E. C. de Bollemont. 9093. June 21.
**Utilising Hydrocarbons for Mechanical Power.** A. S. Jones. 9094. June 21.

# Gazette Notices.

## PARTNERSHIPS DISSOLVED.

S. C. Joyce & Co., Great St. Helens, City, oil brokers.
Malkin & Deakin, Stoke-on-Trent, manufacturers of earthenware and potters' millers.
Oxley Brothers, Liverpool, aerated water manufacturers.
W. Harrop & Co., Tinkersclough, Hanley, earthenware manufacturers; as far as regards H. Hall.
Arch & Brook, Cradley, Worcestershire, chemists and druggists.

## THE BANKRUPTCY ACT, 1883.

### Receiving Orders.

Leslie, Joseph Blackburn (trading as J. B. Leslie and Co.), Sheffield, chemist and druggist.
Scattergood, Robert, Truro and Grampound Road, Cornwall, engineer.
Hanson, Luther, Halifax, electrical engineer.

### Adjudications.

Miles, Thomas, Thurnby, Leicester, and Thurmaston, Leicestershire, brick and tile manufacturer.
Leslie, Joseph Blackburn (trading as J. B. Leslie and Co.), Sheffield, chemist and druggist.
Black, Robert, Whalton and Morpeth, trading with W. Bell, aerated water manufacturer.
Scattergood, Robert, Truro and Grampound Road, Cornwall, engineer.
Dormer, Richard, Garston, near Liverpool, analytical chemist.

### First Meetings and Public Examinations.

Holmes, John Henry, Colwyn, Carnarvonshire, and Colwyn Bay, Denbighshire, pharmaceutical chemist and druggist. July 5, Bankruptcy-office, Chester; July 12, Court-house, Bangor.
Simpson, Henry, Kingston-upon-Hull, fat refiner. July 3, Official Receiver's office, Hull; July 9, Court-house, Hull.
Dormer, Richard, Garston, near Liverpool, analytical chemist. July 4, Official Receiver's office, Liverpool; June 28, Court-house, Liverpool.
Jeffrey, Andrew, Gloucester-road, South Kensington, sanitary engineer. July 4, 33, Carey-street, Lincoln's-inn; July 13, 34, Lincoln's-inn-fields.

### Notices of Dividends.

Ainsworth, Ernest Albert Harrison, late of Maida-vale, now residing out of England, gentleman. First dividend of 3s. any day except Saturday, Chief Official Receiver's offices, 33, Carey-street, Lincoln's-inn.
Booth, Eustace Robert, (trading as Booth and Co.), Bishopsgate-street Within, and Digby-road, Green-lanes, oil and petroleum merchant. First and final dividend of 6½d., any day except Saturday, Chief Official Receiver's offices, 33, Carey-street, Lincoln's-inn.
Burckhardt, Edmund Christian, Chalk Farm-road, oilman. First and final dividend of 7¾d., any day except Saturday, Chief Official Receiver's offices, 33, Carey-street, Lincoln's-inn.
Joures, Robert, South Shields, chemist. First and final dividend of 2s. 1d., June 27, Official Receiver's office, Newcastle-on-Tyne.

# IMPORTS OF CHEMICAL PRODUCTS
AT
# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending June 16th.*

**Alkali—**
Holland, 200 c. W.G.Taylor & Co.
France, 100 Arnati & Harrison
" 107 Pokorny, Fielder & Co.

**Alum—**
Holland, 90 cks. Ohlenschlager Bros.

**Acetic Acid—**
Holland, 17 cks. Beresford & Co.
" 84 cbys. "
" 11 Spies, Bros. & Co.

**Acetate of Lime—**
U. States, 395 bgs. Lister & Biggs

**Bones—**
Sydney, 4 t. Low, Sons & Co.
Melbourne, 13 A. & W. Nesbitt
Gibraltar, 25 Goad, Rigg & Co.
Melbourne, 5 Anning & Cobb
Brisbane, 2½ N.Z.L. & M.A.Co.
" 82 Cotesworth and Powell
" 2½ Leach & Co.
Sydney, 8 Goad, Rigg & Co.
" 15 Hicks, Nash & Co.
U. States, 38 H.A.Lane & Co.
Sydney, 14¼ Leach & Co.
New Zealand, 1½ Flack, Chandler and Co.

**Bromine—**
Germany, 120 cs. A. & M. Zimmermann
" 11 T. Jordan & Co.

**Barium Chloride—**
Germany, 14 cks. Petri Bros.

**Barytes—**
Belgium, 22 cks. J. L. Lyon & Co.
" 22 Harrison & Co.
" 22 J. L. Lyon & Co.
Germany, 19 Prs. Scott's Wharf
" 19 P. Jantzen
" 67 Harrison & Co.

**Chemicals** *(otherwise undescribed)*
Germany, £76 T. H. Lee
" 13 Phillipps & Graves
" 380 A. & M. Zimmermann
" 11 "
Italy, 6 Galbraith, Pembroke and Co.
Germany, 47 A. & M. Zimmermann
" 39 "
France, 21 P. Mitton

**Cream Tartar—**
Italy, 48 cks. W. Carter
France, 10 C. F. Gerhardt
" 9 Webb, Warter and Co.
" 8 "
Spain, 6 "
France, 10 W.C.Bacon & Co.
" 5 J. Puddy & Co.
" 2 Robinson & Co.
" 4 "
Spain, 11 C. Christopherson and Co.
France, 4 G. Ward & Sons

**Caoutchouc—**
Madagascar, 63 c. Adamson and Ronaldson
U. States, 47 C. de Murrieta and Co.
E. Indies, 45 L. & S. K. D. Co.
Zanzibar, 10 E. & W. I. D. Co.

**Caoutchouc**—*continued*
E. Indies, 91 c. R. & J. Henderson
" 3 Anderson, Fairley and Co.
" 262 G. Ward & Sons
Mauritius, 2 Blyth, Greene & Co.
Java, 2 L. & S. K. D. Co.

**Caustic Potash—**
France, 200 c. J. Cripps

**Dextrine—**
Germany, 100 bgs. Ross & Deering

**Dyestuffs—**
**Cutch**
France, 50 bxs. Hoare, Wilson & Co.
**Extracts**
France, 41 cs. Negretti & Harrison
" 85 pkgs. G.S.N. Co.
" 99 cs. L. J. Levinstein & Sons
Belgium, 22 cs "
France, 41 T. H. Lee
Austria, 500 brls. A.J.Humphery
France, 50 cks. Webb, Warter and Co.
**Gambier**
E. Indies, 382 bls. J. Swire & Sons
" 304 J. H. & G. Scovell
" 381 R. & J. Henderson
**Tanners' Bark**
Adelaide, 46 t Devitt & Hett
" 39 Hicks, Nash & Co.
" 23 Baxter & Hoare
" 50 J. Vicary & Sons
" 20 "
Melbourne, 300 Elkan & Co.
" 100 Baxter & Hoare
" 31 Stahlschmidt & Co.
" 300 Phillipps & Graves
N. Zealand, 37 E. & W. I. D. Co.
Melbourne, 130 Hicks, Nash & Co.

**Indigo**
Holland, 14 chts. Patry & Pasteur
E. Indies, 6 L. & S. K. D. Co.
" 37 E. & W. I. D. Co.
" 9 Benecke, Souchay and Co.
" 33 Stansbury & Co.
" 12 Phillipps & Graves
" 18 H. Lambert
" 3 Ernsthausen & Co.
" 14 Stansbury & Co.
" 5 Elkan & Co.
" 38 L. & S. K. D. Co.
" 6 "
" 163 E. & W. I. D. Co.
" 60 Arbuthnot, Latham and Co.
" 54 R. von Glehn & Sons
" 4 Stansbury & Co.
**Capilo**
E. Indies, 2 cs. E. & W. I. D. Co.
**Annatto**
France, 10 brls. R. J. Fulwood & Co.
**Orchella**
U.S. Columbia, 23 bls. L. & S. K. D. Co.
Morocco, 1 ble. Robinson & Co.
**Shumac**
Italy, 14 bgs. J. Terry & Co.
**Madder**
Holland, 3 cks. N. Smith
**Turmeric**
Belgium, 98 bgs. Sawer, Mead & Co.
**Myrabolams**
E. Indies, 3,069 bgs. Lewis & Peat
**Argols**
Italy, 381 bgs. B. Jacob & Sons
**Glycerine—**
Holland, £52 Baxter & Hoare
France, 500 Gibbs & Co.

**Guano—**
St. Helena, 8½ t. S. Magnus
Ichaboe, W.A., 395 t. D.de Pass & Co.
**Gutta Percha—**
E. Indies, 726 c. Jewesbury & Co.
**Glucose—**
Germany, 300 cwts. Barber & Co.
" 209 Pillow, Jones & Co.
France, 220 M. H. Voss
Germany, 5 pkgs. Beresford & Co
" 60 P. Windmuller
" 380 Wiskeman & Co.
U. States, 400 G. Doo
France, 200 Weatherley & Co.
" 200 Barrett, Tagant & Co.
Melbourne, 66 J. Forsey
Germany, 300 L. Sutro & Co.
" 233 J. Cooper
" 60 T. H. Lee
" 237 Andorsen, Becker and Co.
" 171 Prs. Chamberlain's Wharf
" 200 Hyde, Nash & Co.
" 500 Drummond & Co.
" 200 Pickford & Co.
**Isinglass—**
E. Indies, 2 pkgs. E.&W.I.D.Co.
**Manure—**
**Phosphate Rock**
Portugal, 252 t. G. M. Bauer
Pt. Royal, S.C., 2,370 t. Fox, Roy & Co.
Belgium, 150 t. Silvertown Manure Company
" 105 "
Montreal, 230 Moeller, Graetz & Co.
Belgium, 105 Anglo-Continental Guano Co.
Jamaica, 100 Cloid, Routledge, and Co.
**Horn Piths**
Brisbane, 3½ t Cotesworth & Co.
**Phosphate Lime**
Belgium, 127 t. T. Farmer & Co.
" 155 "
**Bones**
Taganrog, 7 t. G. Bennett & Sons
**Stone**
France, 30 t. J. Burnett & Sons
" 240 J. B. White & Bros.
**Salt**
Germany, 50 t. Perkins & Homer
**Naphtha—**
U. States, 80 brls. Lister & Biggs
**Oxalate of Potash—**
Germany, 10 cks. O. Andreae & Co.
**Pearl Ash—**
Canada, 45 c. Charles & Fox
France, 200 F. W. Berk & Co.
**Potassium, Hydrated—**
Holland, 5 cks. Spies, Bros. & Co.
**Paraffin Wax—**
U. States, 120 brls. G. H. Frank
" 570 J. H. Usmar & Co.
**Potassium Carbonate—**
France, 220 c. J. Cripps
**Plumbago—**
Germany, 4 cks. Becker & Co.
" 62 pkgs. Prs. Dowgate Dock
Holland, 138 cks. Brown & Elmslie
Germany, 17 "
" 12 Horne & Crampton
" 21 Beresford & Co.
Italy, 64 Thredder, Son & Co.
**Pyrites—**
Spain, 1,536 t. Tennant, Sons & Co.
" 2,000 "
Brisbane, 10 Vivian & Sons
Spain, 1,100 Soc. Commerciale
**Potash—**
Canada, 95 c. S. Ward & Co.
Germany, 17 cks. Paton & Charles
Holland, 110 c. H. Faber & Co.
Germany, 17 cks. Paton & Charles
**Pitch—**
Germany, 42 brls. Berlandina Bros. and Company
**Sugar of Lead—**
Germany, 17 cks. F. Smith
**Sodium Borate—**
Germany, 15 cks. F. Smith
**Salts Tartar—**
France, 105 c. F. W. Berk & Co.
**Sodium Phosphate—**
Holland, 6 cks. Middleton & Co.
**Saltpetre—**
Germany, 58 cks. J. Hall & Son
" 40 P. Hecker & Co.
" 80 T. Merry & Son
E. Indies, 289 bgs. E.&W.I.D.Co.
Germany, 100 P. Hecker & Co.
E. Indies, 1,761 E.&W.I.D.Co.
" 1,195 C. Wimble & Co.
Germany, 50 kgs. Hecker & Co.
**Stearine—**
Belgium, 64 bgs. H. Hill & Sons
France, 95 "
Germany, 1 ck. H. Lambert
" 6 cs. Craven & Co.
France, 150 bgs. H. Hill & Sons
Norway, 40 cks. Prs. Scott's Whf.
**Sodium Acetate—**
France, 236 c. A. Zumbeck & Co.
" 100 Hunter, Waters & Co.
**Sulphuric Acid—**
Holland, 1 cs. A. Henry & Co.
**Sulphur Chloride—**
Holland, 20 cs. R. Morrison & Co.
**Sodium Nitrate—**
Iquique, 8,595 bgs. W. Montgomery and Co.
**Tartaric Acid—**
Holland, 12 cks. Webb, Warter, and Co.
" 11 Middleton & Co.
" 5 Northcott & Sons
**Tar—**
France, 62 brls. Berlandina Bros. and Company
**Ultramarine—**
France, 6 cks. G. Rahn & Co.
Holland, 4 H. Kohnstamm
" 10 cs. G. Steinhoff
" 3 Haeffner & Co.
" 10 pkgs. A. Henry & Co.
Belgium, 4 cs. Harrison & Co.
" 19 pkgs. J. L. Lyon & Co.
" 24 4 brls. Leach & Co.
Germany, 5 H. Brooks & Co.
Belgium, 1 cs. Leach & Co.
Holland, 5 G. Steinhoff
" 4 Glaeser & Vogeler
Germany, 25 E. von Rehn
Belgium, 10 pkgs. Leach & Co.
**Verdigris—**
France, 3 cks. N. Steinberg
**Zinc Oxide—**
Holland, 20 cks. M. Ashby
" 50 H. Konigs & Co.
" 100 brls. M. Ashby
Germany, 271 "
Holland, 50 H. Hodson & Co

## LIVERPOOL.

*Week ending June 20th.*

**Albumen—**
Boston, 4 cks. 4 kgs. Baerlein & Co.
Trieste, 13 cs R. Schloesser & Sons
**Alum—**
Rotterdam, 41 cks.
**Bones—**
Ceara, 21 t. A. V. Heyder & Co.
Valparaiso, 63 sks. Torrome, Sons and Co.
Talcahuano, 400 sks. T. Berg
Cadiz, 500 H. S. Vidal & Co.
**Borate of Lime—**
Iquique, 35 brls. J. Inglis & Co.
" 6 A. Gibbs, Son & Co.
Antofogasta, 675 sks. Le Chavalier, Frères & Co.
**Boracic Acid—**
Leghorn, 16 cks. Shropshire U. Co.
" 10
**Brimstone—**
Catania, 250 t.
**Cream Tartar—**
Barcelona, 4 cks.
Tarragona, 2
Patras, 18 cs. C. Raptopulo & Co.
" 2 N. Lappa
Oporto, 5 cks. Inglis & Wulff.
**Chloroform—**
Hamburg, 1 cs.
**Chemicals** *(otherwise undescribed)*
Rouen, 15cks. Co-op. W'sale. Soc. Ld.
**Camphor—**
Hamburg, 1 ck.
**Caoutchouc—**
Demerara, 1 cs. G. Booker & Co.
Salt Pond, 2 brls. Pickering and Berthoud
" 1 cs. 2 W. Griffiths & Co
Cape Coast, 1 cs. 2 brls. C. Freise
" 1 cs. 3 brls. C. L. Clare & Co.
" 2 Pickering & Berthoud
" 17 F. & A. Swanzy
" 5 B. B. & Co.
" 2 Edwards Bros.
" 2 L. Hart & Co.
" 2 J. Quay & Nephew
Sierra Leone, 8 Pickering & Berthoud
" 12 12 cks. 1 pn.
Goree, 11
Ceara, 2 bls. R. Singlehurst & Co.
**Dyestuffs—**
**Orchella**
Lisbon, 64 bls. W. & R. Graham & Co.
**Madder**
Rotterdam, 5 cks.
**Valonia**
Patras, 601 bgs.
**Shumac**
Palermo, 250 bgs. Kitchen & Co.
**Extracts**
New York, 100 bxs.
**Argols**
Oporto, 47cks. German Bank, London
Bordeaux, 43 cks.
**Divi Divi**
Havre, 105 sks. Cunard S. S. Co.
Rio Hacha, 180 t. E. Brownbill & Co.
**Gasoline—**
New York, 500 cs.
**Glucose—**
Stettin, 4 cks. 20 bgs. G. G. Mackay
" 8 F. B. Jackson
" 93
Hamburg, 25 cks.
**Gelatine—**
Rouen, 36 bls.
**Horn Piths—**
Paysandu, 4,000 piths. H. Brown
Valparaiso, 26 sks. Torrome, Sons & Co.
**Iron Oxide—**
Trieste, 20 brls.
**Litharge—**
Rotterdam, 8 cks.
**Naphtha—**
New York, 2,549 brls.
**Pyrites—**
Huelva, 1,432 t. Matheson & Co.
**Plumbago—**
Genoa, 80 bgs.
**Pitch—**
Rotterdam, 50 t.
Stettin, 5 brls.
Dantzig, 48 cks.
**Phosphate—**
Treport, 200 t. Moller, Gratz & Co.
Aruba, 545 Isaac & Samuel
Montreal, 410 Phospho Lime Co.
**Potash—**
Montreal, 11 brls. F. Nickels & Co.
Rouen, 12 cks.
Rotterdam, 73
**Salts of Potash—**
Hamburg, 2,889 bgs.
**Silica—**
Hamburg, 65 bgs.
**Sodium Nitrate—**
Iquique, 9,615 sks. Le Chevalier, Freres & Co.
Rotterdam, 5 cks.
**Saltpetre—**
Calcta Buena, 7,604 sks.
**Sulphuric Acid—**
Dantzig, 1 dm.
**Sulphur—**
Catania, 520 bgs. 90 brls.
**Sodium Phosphate—**
Rotterdam, 10 cks.
**Sodium Bisulphite—**
Hamburg, 115 cks.
**Tar Oil—**
Hamburg, 2 cks.
**Tartar—**
Naples, 12 cks.
**Tar—**
Marseilles, 25 cks.
**Tartaric Acid—**
Messina, 10 cks.
Rotterdam, 4
Bordeaux, 11 hds.
**Ultramarine—**
Rotterdam, 26 pkgs.
" 20 cks.
Ghent, 3 brls.
**Verdigris—**
Marseilles, 6 cks.
**Zinc Oxide—**
Stettin, 70 brls. F. Matthews & Co.
" 50

## GLASGOW.

*Week ending June 23rd.*

**Albumen—**
Antwerp, 29 cs. 4 cks.
**Acetic Acid—**
Rotterdam, 17 ballons. J. Rankine and Son
**Barytes, Sulphate—**
Antwerp, 120 bgs.
Rotterdam, 45 cks.
" 43
**Cream Tartar—**
Marseilles, 2 brls. Small, Yuill & Co.
" 2 C. Tennant & Co.
" 3
Tarragona, 2 pipes. G. F. Holding
**Chemicals** *(otherwise undescribed)*
Hamburg, 2 cs.
Rotterdam, 5 cks. J Rankine & Sons
**Dyestuffs—**
**Extracts**
Antwerp, 1 ck.
**Alizarine**
Rotterdam, 133 cks.
**Gypsum—**
Rouen, 120 t.
**Guano—**
Monte Video, 7917 bgs. A. Cross & Son
Sorvar, 441 sks.
**Guano Residue—**
Monte Video, 439 bgs. A. Cross & Son
**Horn Piths—**
Monte Video, 5½ t. A. Cross & Son
**Paraffin Wax—**
New York, 50 brls.
**Pyrites—**
Huelva, 1,250 t. J. R. Cunningham, Jr.
**Sulphur—**
Marseilles, 60 brls. Evans, Sons and Mason Ltd.
**Tartaric Acid—**
Rotterdam, 4 cks. J. Rankine & Son
**Waste Salt—**
Windau, 400 t.
Hamburg, 500 bgs. 77 cks.
**Zinc Oxide—**
Rotterdam, 15 cks. J. Rankine & Son
Antwerp, 25 "
Rotterdam, 50 "

## HULL.

*Week ending June 21st.*

**Alumina—**
Rotterdam, 47 cks. W. & C L. Ringrose
**Barium—**
Hamburg, 1 cs.
**Barytes—**
Antwerp, 44 brls. Bailey & Leetham
" 200 bgs. 38 brls. H. F. Pudsey
Bremen, 23 cks. Tudor & Son
Rotterdam, 19 cks. Wilson, Sons and Co.
**Chemicals** *(otherwise undescribed)*
Antwerp, 48 pkgs. Wilson, Sons & Co.
Hamburg, 12 cs. "
New York, 50 brls.
**Chloride of Sulphur—**
Rotterdam, 2 demijohns G. Lawson and Sons
" 9 "
**Dyestuffs—**
**Aniline**
Rotterdam, 1 ck. Wilson, Sons & Co.
**Dyestuffs** *(otherwise undescribed)*
Hamburg, 134 bgs. Wilson, Sons & Co
**Alizarine**
Rotterdam, 41 cks. Hutchinson and Son
" 11 W. & C. L. Ringrose
" 25 "
" 10 Hutchinson & Son
**Indigo**
Amsterdam, 10 chts. W. & C. L. Ringrose
**Dextrine—**
Hamburg, 25 bgs.
**Glucose—**
Stettin, 1,000 bgs. C. M. Lofthouse and Co.
**Glycerine—**
Amsterdam, 9 pkgs. W. & C. L. Ringrose
**Horn Piths—**
Hamburg, 11 bls. G. Sykes & Sons
" 61 "
**Naphthol—**
Rotterdam, 10 cks. W. & C. L. Ringrose
**Plumbago—**
Hamburg, 85 cks. Wilson, Sons & Co.
" 1 Bailey & Leetham
" 9 W. H. Walton & Co.
**Potash—**
Rotterdam, 11 cks. Hutchinson & Son
**Saltpetre—**
Hamburg, 50 bgs. Wilson, Sons & Co

**Salt**—
Hamburg, 74 cs. Wilson, Sons & Co.
**Tartar**—
Bordeaux, 1 ck. Rawson&Robinson
**Turpentine**—
Bordeaux, 6 brls. "
" 260 cks. "
**Tar**—
Gothenburg, 1 brl. Wilson,Sons&Co
**Tartaric Acid**—
Rotterdam, 11 cks. Hutchinson&Son
" 10 "
**Ultramarine**—
Rotterdam, 4 cks. SissonBros.&Co.

## TYNE.

*Week ending June 23rd.*

**Barytes**—
Rotterdam, 1 cs. Tyne S. S. Co.
**Carbon**—
New York, 32 brls. Tyne S. S. Co.
**Glucose**—
Hamburg, 10 cks. Tyne S. S. Co.
**Saltpetre**—
Harburg, 120 t.
**Salt**—
Hamburg, 450 bgs. Tyne S. S. Co.
**Ultramarine**—
Rotterdam, 1 cs. Tyne S. S. Co.
**Zinc Oxide**—
Antwerp, 20 brls. Tyne S. S. Co.

## GRIMSBY.

*Week ending June 23rd.*

**Chemicals** *(otherwise undescribed)*
Hamburg, 27 pkgs.
Rotterdam, 24 cks.
**Zinc Ashes**—
Antwerp, 42 pkgs.

## GOOLE.

*Week ending June 20th.*

**Potash**—
Hamburg, 5 bgs.
Calais, 40 dms.
Dunkirk, 34 19 cks.
**Saltpetre**—
Rotterdam, 200 bgs.
**Waste Salt**—
Hamburg, 50 t.
" 500 bgs.
" 550 cks.
" 203 t.

# EXPORTS OF CHEMICAL PRODUCTS

FROM

# THE PRINCIPAL PORTS OF THE UNITED KINGDOM.

## LONDON.

*Week ending June 18th.*

**Ammonia Carbonate**—
Stettin, 4 cks. £28
St. Petersburg, 5 t. 127
**Ammonia Muriate**—
Sydney, 3 t. 2 c. £87
**Arsenic**—
Melbourne, 11 t. £136
Monte Video, 1 14
**Ammonia Sulphate**—
Trinidad, 29 t. 19 c. £379
Calcutta, 3 42
**Boracic Acid**—
Lisbon, 4 cks. £25
**Bisulphide of Carbon**—
Rotterdam, 5 t. 3 c. £73
**Borax**—
Melbourne, 16 c. £20
**Citric Acid**—
Montreal, 3 c. £25
Sydney, 5 43
Brussels, 10 kgs. 87
Santander, 3 brls. 28
Amsterdam, 7 kgs. 64
Hamburg, 1 ck. 44
**Cream Tartar**—
Adelaide, 5 c. £30
Brisbane, 1 t. 11 240
Sydney, 2 10 305
Melbourne, 1 127
**Chemicals** *(otherwise undescribed)*
Bombay, 42 pkgs. £300
Shanghai, 14 kgs. 68
Adelaide, 13 cs. 260
New York, 2 t. 5 c. 250
Hamburg, 10 cks. 85
Melbourne, 2 cs. 20
**Copper Sulphate**—
Paris, 15 t. 1 c. £289
**Caustic Soda**—
Melbourne, 20 t. 4 c. £178
**Carbolic Acid**—
Hamburg, 4 t. 14 c. £165
**Disinfectants**—
Hong Kong, 3 cs. £15
Penang, 150 dms. 60
**Manure**—
Motril, 173 t. 18 c. £1,740
Ghent, 100 bgs. 110
Barbadoes, 80 860
Antigua, 52 cks. 281
Cullera, 472 4 c. 4,013
Las Palmas,15 173
Hamburg, 100 1,200
**Picric Acid**—
Hong Kong, 10 cs. £67
Gothenburg, 2 cks. 32
**Saltpetre**—
Rio Janeiro, 10 t. 14 c. £236
Madeira, 16 21
Montreal, 7 12 164
Harlingen, 1 18 40
Wellington, 10 kgs. 11
Sydney, 6 pkgs. 23
Valencia, 12 c. 14
Gothenburg, 1 21
Batoum, 4 10 94
Oporto, 9 12 197
**Sulphuric Acid**—
Natal, 7 cs. £10
Sydney, 16 pkgs. 24
**Soda Crystals**—
Sydney, 20 t. 17 c. £49
Wellington, 49 19 127
**Sodium Nitrate**—
Antigua, 5 t. 1 c. £50
*St. Kitts, 4* 38
**Sulphur, Flowers**—
Madeira, 40 brls. £32
Lisbon, 470 380
**Salts of Lime**—
Montreal, 4 cks. £40
**Sheep Dip**—
Christchurch, 225 pkgs. £167
Port Natal, 160 dms. and 5 t. 290
Capetown, 3 t. 7 c. 140
Algoa Bay, 20 cs. and 2 c. 51
New York, 13 t. 8 c. 550
Monte Video, 20 13 416
**Sodium Bicarbonate**—
Brisbane, 62 cks. £24
Sydney, 40 5 cs. 80
**Sulphur**—
Madeira, 1 t. 14 c. £13
**Tartaric Acid**—
Montreal, 3 c. £25
Sydney, 10 pkgs. and 1 t. 7 292
Melbourne, 10 85
Brisbane, 1 1 181
Adelaide, 10 80
Auckland, 5 40

## LIVERPOOL.

*Week ending June 20th.*

**Ammonia**—
Monte Video, 2 c. £3
**Alum**—
Havana, 4 t. 13 c. 1 q. £26
Monte Video, 2 12
Beyrout, 3 18 24
Dunedin, 1 7 9
Melbourne, 1 1 6
Galatz, 5 30
Odessa, 5 3 30
Seville, 25 4 3 138
BuenosAyres, 1 10 9
Alexandretta, 1 5 6
Vera Cruz, 1 1 10
Valencia, 2 1 10
Syra, 2 17 14
San Francisco,25 6 160
**Ammonia Carbonate**—
Odessa, 1 t. 3 c. 2 q. £44
Genoa, 2 9 91
**Albumen**—
Vera Cruz, 8 cks. £90
New York, 2 t. 10 c. 160
**Ammonia Sulphate**—
Barcelona, 11 t. 9 c. 2 q. £316
Oporto, 1 12
Valencia, 60 16 1 656
**Acetic Acid**—
Vera Cruz, 30 cs. £79
**Ammonia Muriate**—
New York, 5 t. 2 c. £125
**Aluminous Cake**—
Calcutta, 10 t. 10 c. £32
Dunedin, 4 4 2 q. 13
Ancona, 18 54
Geelong, 6 16 20
**Alkali**—
New York, 46 t. 15 c. £240
**Arsenic**—
Barcelona, 1 t. 2 c. 1 q. £13
**Borax**—
New York, 93 t. 1 c. £2,791
Lisbon, 2 3 q. 5
Bilbao, 5 7
Algiers, 3 5
**Bisulphite of Lime**—
Sydney, 1 t. 11 c. 2 q. £13
Melbourne, 1 11 2 £13
**Bleaching Powder**—
Antwerp, 73 cks.
Bilbao, 25 brls. 26
**Bleaching Powder**—*continued.*
Bombay, 9 cs.
Boston, 971 cks.
Calcutta, 198 cs.
Genoa, 382
Galveston, 14 brls.
Ghent, 28
Halifax, 3 bxs.
Leghorn, 50 brls. 30
Madrid, 17
Montreal, 43 tcs. 190
Naples, 20
New York, 56 tcs. 125
Rotterdam, 6
Seville, 15 brls.
Venice, 50
Vera Cruz, 21 brls.
**Carbolic Acid**—
New York, 9 t. 5 c. £810
**Chemicals** *(otherwise undescribed)*
Beyrout 7 c. 3 q. £15
Syra, 17 27
Buenos Ayres, 5 t. 150
Havre, 109 16 1,192
Antwerp, 5 7 3 162
Dantzig 6 9 3 195
Genoa, 3 2 10
Stettin, 107 1 937
Hong Kong, 5 19 118
Odessa, 4 1 202
New York, 5 333
C.C.Castle,1 cs. 5
Rotterdam, 18 130
Ibrail 14 2 23
Alexandria, 9 14
**Carbon**—
New York, 5 c. £15
**Charcoal Refuse**—
Hamburg, 68 t. £272
**Charcoal**—
New York, 12 t. 13 c. 3 q. £50
Hamburg, 130 14 522
Nantes, 4 19 20
**Carbolic Disinfectant**—
Baltimore, 1 t. £90
**Citric Acid**—
San Francisco, 1 c. £12
Vera Cruz, 1 9
Bilbao, 1 9
**Cream Tartar**—
Halifax, 1 t. 2 c. 1 q. £132
Montreal, 10 1 62
Quebec, 10 60
**Carbon Bisulphide**—
Buenos Ayres, 5 c. £18
**Copper Sulphate**—
Lisbon, 10 c. £10
Barcelona, 9 t. 2 3 q. 184
Genoa, 5 3 100
Rouen, 74 1,225
Antwerp, 4 19 105
**Cobalt Oxide**—
Gijon, 1 c. £50
**Carbonate of Lime**—
Lisbon, 1 t. 5 c. 3 q. £7
**Caustic Potash**—
Adelaide, 7 c. £7
**Copperas**—
Vera Cruz, 2 t. 8 c. £5
Calcutta, 12 23
Syra, 2 8 5
**Calcium Chloride**—
Sydney, 5 t. £9
**Caustic Soda**—
Adelaide, 163 dms.
Alicante, 20 brls. 30
Alexandria, 50
Amsterdam, 95
Algoa Bay, 10 bxs.
Antwerp, 108
Bahia, 29
Barcelona, 50 cks. 28
Bari, 57
**Caustic Soda**—*continued.*
Bilbao, 95 dms.
Boston, 700
Callao, 8
Catania, 40
Carthagena, 100 brls. 27
Ceara, 20
Corunna, 4 brls. 44
Fairwater, 204
Fiume, 29
Galatz, 25
Genoa, 109
Hamburg, 33
Ibrail, 25
Lisbon, 10
Madrid, 104
Manilla, 50 kgs. 8 brls. 210
Malta, 10
Marseilles, 250
Matanzas, 25 kgs.
Melbourne, 107
Monte Video, 100
Montreal, 430
Nagasaki, 50
New York, 1,697
Nantes, 35
Odessa, 200
Newfairwater, 100
Philadelphia, 220 brls. 80
New Orleans, 50
Oporto, 25
Rotterdam, 15 kgs. 5 brls. 17
Passages, 64
Port Natal, 47 bxs.
San Francisco, 265
Quebec, 23
Riga, 173
Seville, 369
Rouen, 134
St. Petersburg, 220
Singapore, 10
Savanilla, 20
Stettin, 73
Stockholm, 70
Sydney, 12 brls. 80
Valencia, 70
**Disinfecting Powder**—
East London, 3 t. 10 c.
Hamburg, 2 16 3 q.
**Dunging Salts**—
New York 4 t. 5 c.
**Disinfectants**—
Hong Kong, 10 c. 2 q.
**Magnesium Carbonate**—
Ocos, 10 cks.
Havre, 7 c. 2 q.
Odessa, 10 cks.
**Magnesium Chloride**—
Bombay, 2 t. 10 c.
Rouen, 5 17
**Magnesium Sulphate**—
Melbourne, 4 c.
Sydney, 1 2 q.
**Manure**—
Barbadoes, 50 t.
**Oxalic Acid**—
Marseilles, 6 c. 2 q.
St. Petersburg, 1 t. 17 3
Boston, 7 5 2
Venice 6 2
**Potassium Chlorate**—
New York, 11 t. £56
Hong Kong, 1 51
Genoa, 2 14 c. 143
Rotterdam, 5 274
Philadelphia, 7 33
Naples, 10 26
Buenos Ayres, 4 5 223
Hamburg, 2 107
Corunna, 10 20
Bari, 15 15
St. Petersburg, 15 103
Vera Cruz, 6 17

**Potassium Prussiate—**
Vera Cruz, 1 t. 5 c. £92
Rouen, 5 7 1 q. 275
**Potashes—**
Catania, 2 t. 16 c. £66
Monte Video, 9 13
**Phosphorus—**
Havana, 9 c. £98
Mayaguez, 3 q. 5
Porto Rico, 9 3 148
**Potassium Bichromate—**
Barcelona, 6 t. £247
St. John's, N.F., 4 c. 11
Rouen, 48 8 1 q. 2,087
**Picric Crystals—**
Hamburg, 3 t. £391
**Potassium Stannate—**
Bombay, 11 c. £43
**Pitch—**
Lagos, 20 brls.
Antwerp, 150 t.
Coquimbo, 5 brls.
**Sodium Bisulphite—**
Boston, 38 t. 10 c. £195
**Sulphur—**
Gothenburg, 15 t. 1 c. 2 q. £66
Halifax, 20 90
Calcutta, 30 165
Pernambuco, 1 2 3 8
**Sodium Nitrate—**
Santander, 1 t. 1 c. 1 q. £10
Fiume, 6 5 3 57
Valencia, 6 2 2 56
**Salammoniac—**
Syra, 3 c. £6
Smyrna, 10 3 q. 21
**Sheep Dip—**
Montreal, 12 c. £11
**Saltpetre—**
Carthagena, 45 t. £720
Vera Cruz, 3 2 c. 2 q. 68
**Soap Powder—**
New York, 6 t. 6 c. 3 q. £110
**Salts of Sorrel—**
Bilbao, 2 c. £6
**Soda Salts—**
San Francisco, 12 c. £6
**Salt—**
Adelaide, 410 t.
Antwerp, 527
Akassa, 427
Archangel, 328
Bakana, 27
Baltimore, 725
Benin, 14
Buenos Ayres, 25
Buguma, 60
Cameroons, 47
Calcutta, 9,922
Chicago, 32
Christiania, 500
Detroit, 32
Gefle, 37
Iceland, 100
Kingston, Jam., 35
Malta, 5
Mauritius, 44
Melbourne, 323
Montreal, 604
Port Natal, 25
Moss, 450
New Orleans, 483
New York, 105
Philadelphia, 200
Old Calabar, 99
Rio de Janeiro, 5
St. John, 698
San Francisco, 94
St. John's, 20
Stockholm, 150
Shediac, 399
Sydney, 470
Sundswall, 106
Touris, 62
Talcahuano, 30
Trinidad, 49
Valparaiso, 91
Wellington, 78
**Soda Ash—**
Alexandria, 14 cks.
Barcelona, 6
Beyrout, 50 brls.
Bilbao, 70
Boston, 147 tcs. 400 bgs. 175
Genoa, 18
Lisbon, 10 10 pps.
Malta, 18
Melbourne, 454
Montreal, 78 tcs. 21
New York, 371 278
Odessa, 75
Oporto, 16
Rio de Janeiro, 250 brls.
Philadelphia, 27
Rio Grande do Sul, 50
Porto Alegre, 50

**Soda Ash**—*continued*
Rosario, 30 brls.
Santander, 20 cks.
Smyrna, 60
Syra, 200
Vera Cruz, 8
**Soda Crystals—**
Adelaide, 301 brls.
Bilbao, 17
Monte Video, 20
Santander, 36
Smyrna, 50
**Sodium Biborate—**
Antwerp, 11 brls.
Buenos Ayres, 100 cs.
**Sodium Silicate—**
Bilbao, 23 brls.
Malaga, 4
New York, 50 cks.
Santander, 35 brls.
Seville, 100
**Sodium Bicarbonate—**
Adelaide, 60 brls.
Boston, 50 cks.
Antwerp, 15
Barcelona, 200 kgs.
Calcutta, 100
Hamburg, 108 cs.
Malaga, 2 brls. 10
Melbourne, 150
Nagasaki, 200
Rosario, 50
Rotterdam, 5
St. Petersburg, 750
Stettin, 28 cks. 196 35
Venice, 100
**Tartaric Acid—**
Vera Cruz, 1 c. £9
**Tar—**
Lagos, 20 brls.
King's Cove, 10
**Verdigris—**
New York, 9 c. £28
**Zinc Muriate—**
Bombay, 1 t. 18 c. £30
New York, 5 cks. 41

## GLASGOW.

*Week ending June 23rd.*

**Ammonia Sulphate—**
Trinidad, 4 t. 19 c. £60
Passages, 20 240
**Ammonia Liquor—**
Calcutta, 8 t. 12 c. £214
**Benzol—**
Dieppe, 11 puns. 86 pkgs. £602
**Bleaching Powder—**
Kurrachee, 1 t. 19 c. £22
**Charcoal—**
Dieppe, 251 bgs. £12
**Caustic Soda—**
Philadelphia, 72 t. 11 c. £533
**Epsom Salts—**
Quebec, 6 t. £20
**Iodine—**
Rotterdam, 2 cks. £520
**Litharge—**
Antwerp, 1 t. 5 c. £22
**Manure—**
**Manure** *(otherwise undescribed)*
Trinidad, 86 t. 5 c. £887
Demerara, 145 3 1,536
Hamburg, 75 11 350
**Slag Phosphate**
Demerara, 27 t. 12 c. £50
**Paraffin Wax—**
Melbourne, 31 t. £765
Bordeaux, 1 1 c. 69
**Potassium Bichromate—**
Rotterdam, 2 cks. £34
" 1 17
Amsterdam, 3 52
Antwerp, 11 t. 17 c. 419
Bordeaux, 2 16 118
Antwerp, 13 18 485
Quebec, 1 13 68
Stockholm, 2 cks. 32
**Pitch—**
Dieppe, 240 t. £156
**Sulphuric Acid—**
Kurrachee, 18 t. 8 c. £180
Madras, 8 18 42
Monte Video, 2 8 23
**Soda Crystals—**
Calcutta, 1 t. 2 c. £35
**Sodium Bichromate—**
Quebec, 3 t. 7 c. £109
**Tar—**
Madras, 31 t. 4 c. £60
Stockholm, 16 41

## HULL.

*Week ending June 19th.*

**Alkali—**
Amsterdam, 4 cks.
Trieste, 20
Wasa, 7
**Ammonia Sulphate—**
Hamburg, 141 t.
Dunkirk, 50
Antwerp, 20
Rotterdam, 13
**Bleaching Powder—**
Amsterdam, 33 cks.
Christiania, 5
**Bone Size—**
Antwerp, 10 cks.
Bremen, 20
Hamburg, 5
Harlingen, 10
**Chemicals** *(otherwise undescribed)*
Antwerp, 8 cs. 3 cks.
Abo, 2 pks.
Bari, 240
Bremen, 5
Boston, 50 pkgs.
Christiania, 20 64 10 pks.
Copenhagen, 3 91
Dunkirk, 1 36
Dantzig, 31 88 29
Ghent, 5
Gothenburg, 9 60
Hamburg, 43 12 65
Lisbon, 20
New York, 100 40
Reval, 9
Rouen, 53
Rotterdam, 1 58 212
St. Petersburg, 45
Stockholm, 50
Trieste, 1
Uleaborg, 20
Wasa, 10
**Creosote—**
Dantzig, 15 cks.
**Caustic Soda—**
Libau, 36 dms.
**Dyestuffs** *(otherwise undescribed)*
Antwerp, 1 cs. 2 cks.
Boston, 5
Fiume, 5 brls.
Hamburg, 2
Rotterdam, 1 3 3 kgs.
St. Petersburg, 20
**Manure—**
Antwerp, 150 bgs.
Hamburg, 430
Riga, 77
**Pitch—**
Antwerp, 400 t.
**Soap Leys—**
Rotterdam, 20 dms.
**Soda Crystals—**
Venice, 37 cks.
**Tar—**
Dantzig, 5 cks.
Gothenburg, 2

## TYNE.

*Week ending June 23rd.*

**Alum—**
Montreal, 10 t. 2 c.
**Ammonia Carbonate—**
Barcelona, 12 c.
Odense, 1 t. 10
Randers, 5
**Alkali—**
Antwerp, 10 t. 14 c.
Hamburg, 6 18
Bergen, 25 4
Savona, 10
Trieste, 12 3
**Ammonia—**
Pomaron, 5 c.
**Bleaching Powder—**
Antwerp, 15 t. 2 c.
Hamburg, 35 7
Newfairwater, 70 7
Dantzig, 11 3
Rotterdam, 16 10
Bergen, 4
Copenhagen, 9 17
Stettin, 74 13
Venice, 3 8
St. Petersburg, 286 2
**Barytes Carbonate—**
Rotterdam, 5 t.
Copenhagen, 1
Stettin, 209 6 c.
St. Petersburg, 10
**Caustic Soda—**
Montreal, 7 t.
Christiania, 1 8 c.
Hamburg, 15 12
Trieste, 2 18
St. Petersburg, 28 16
**Chemicals** *(otherwise undescribed)*
Pomaron, 3 c.
**Copperas—**
Sundsvall, 15 t. 8 c.
**Hydrochloric Acid—**
Pomaron, 7 c.
**Litharge—**
Christiania, 6 c.
Antwerp, 6
Hamburg, 1 t. 14
Rotterdam, 3
**Magnesia—**
Montreal, 6 c.
Hamburg, 1 t. 1
Barcelona, 12 15
**Nitric Acid—**
Pomaron, 6 c.
**Oxalic Acid—**
Montreal, 1 t. 17 c.
**Ozo Permanganate—**
Jersey, 1 c.
**Potassium Chlorate—**
St. Petersburg, 5 t.
Rotterdam, 1 13 c.
**Potassium Bichromate—**
Bergen, 15 cwt.
**Soda—**
Montreal, 7 t. 19 c.
Allinge, 6 14
Esbjerg, 10 3
Christiania, 5
Odense, 16 8
Antwerp, 7 12
Frederikshavn, 11 10
Nakskov, 3 9
Pomaron, 1 7
Veile, 8 2
Hamburg, 26 12
Barcelona, 11 3
Sundsvall, 65 18
Skjelskor, 13
Cimbrishamn, 8 10
Stettin, 1
**Soda Ash—**
Christiania, 3 t.
Sande, 262 4 c.
Hamburg, 6 2
Barcelona, 2 15
Newfairwater, 200 5
Copenhagen, 4 15
Stettin, 9 19
Venice, 41 19
**Sodium Sulphate—**
Montreal, 30 t. 14 c.
Newfairwater, 20
Copenhagen, 5 10
**Salammoniac—**
Christiania, 4 c.
**Sodium Chlorate—**
Hamburg, 1 t.
**Spirits of Tar—**
Hamburg, 13 c.
**Saltpetre—**
Venice, 2 t. 15 c.

## GRIMSBY.

*Week ending June 23rd.*

**Chemicals** *(otherwise undescribed)*
Antwerp, 2 cks.
Dieppe, 6
" 2 cs. 95 botls.
Hamburg, 2
Rotterdam, 24 dms.

## GOOLE.

*Week ending June 20th.*

**Ammonia Sulphate—**
Rotterdam, 132 t.
**Benzol—**
Antwerp, 26 cks.
Hamburg, 25
Rotterdam, 48
**Chemicals** *(otherwise undescribed)*
Calais, 30 cks.
Hamburg, 5
Rotterdam, 30
Rouen, 10
**Coal Products—**
Dunkirk, 52 cks.
Hamburg, 25
**Manure—**
Rotterdam, 478 bgs.
**Pitch—**
Antwerp, 418 t.

# PRICES CURRENT.

[THURSDAY, June 28, 1888.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

*The values stated are* f.o.r. *at maker's works, or at usual ports of shipment in U.K. The price in different localities may vary.*

| | £ | s. | d. |
|---|---|---|---|
| **Acids:—** | | | |
| Acetic, 25 % ... per cwt. | 0 | 8 | 3 |
| ,, Glacial ... per lb. | 0 | 0 | 6¼ |
| Arsenic, S.G., 2000° ... per cwt. | 0 | 12 | 0 |
| Chromic 82 % ... per lb. | 0 | 0 | 6 |
| Fluoric ... ,, | 0 | 0 | 3½ |
| Muriatic (Tower Salts), 30° Tw. ... per bottle | 0 | 0 | 7 |
| ,, (Cylinder), 30° Tw. ... ,, | 0 | 2 | 9 |
| Nitric, 80° Tw. ... per lb. | 0 | 0 | 2½ |
| Nitrous ... ,, | 0 | 0 | 2 |
| Oxalic ... ,, | 0 | 0 | 3 |
| Picric ... ,, | 0 | 1 | 5 |
| Sulphuric (fuming 40 %) ... per ton | 15 | 0 | 0 |
| ,, (monohydrate) ... ,, | 4 | 10 | 0 |
| ,, (Pyrites, 168°) ... ,, | 3 | 2 | 6 |
| ,, (spent oxide, 168°) ... ,, | 3 | 2 | 6 |
| ,, ( ,, 150°) ... ,, | 1 | 12 | 6 |
| ,, (Pyrites, 150°) ... ,, | 1 | 5 | 0 |
| Tannic (pure) ... per lb. | 0 | 1 | 2½ |
| Tartaric ... ,, | 0 | 1 | 5½ |
| Arsenic, white powdered... per ton | 11 | 15 | 0 |
| Alum (loose lump) ... ,, | 4 | 11 | 3 |
| Alumina Sulphate (pure) ... ,, | 5 | 7 | 6 |
| ,, ,, (medium qualities).. ,, | 4 | 12 | 6 |
| Ammonia, ·880=28°... ... per lb. | 0 | 0 | 3⅛ |
| ,, =24°... ,, | 0 | 0 | 1¾ |
| ,, Carbonate ... ,, | 0 | 0 | 3⅛ |
| ,, Muriate ... per ton | 22 | 0 | 0 |
| ,, ,, (sal-ammoniac) ... per cwt. | 34/- & 32/- | | |
| ,, Nitrate ... per ton. | 35 | 0 | 0 |
| ,, ,, (pure) ... ,, | 70 | 0 | 0 |
| ,, Phosphate ... per lb. | 0 | 0 | 11 |
| ,, Sulphate (grey), London ... per ton | 11 | 13 | 9 |
| ,, ,, (grey), Hull ... ,, | 11 | 12 | 6 |
| Aniline Oil (pure) ... per lb. | 0 | 0 | 9½ |
| Aniline Salt ,, ... ,, | 0 | 0 | 8 |
| Antimony ... per ton | 37 | 10 | 0 |
| ,, (tartar emetic) ... per lb. | 0 | 1 | 1 |
| Barium Chloride ... per ton | 7 | 10 | 0 |
| ,, Carbonate (native) ... ,, | 4 | 0 | 0 |
| ,, Sulphate (native levigated) ... ,, | 3 | 0 | 0 |
| Bleaching Powder, 35 %... ... ,, | 7 | 6 | 3 |
| ,, Liquor, 7 % ... ,, | 2 | 12 | 6 |
| Bisulphide of Carbon ... ,, | 11 | 10 | 0 |
| Calcium Chloride ... ,, | 2 | 0 | 0 |
| China Clay (at Runcorn) in bulk ... ,, | 16/- to 32/- | | |
| **Coal-Tar Dyes:—** | | | |
| Alizarine (artificial), 20 % ... per lb. | 0 | 0 | 9 |
| Magenta ... ,, | 0 | 3 | 9 |
| **Coal-Tar Products:—** | | | |
| Anthracene, 30 %, f.o.b. London, per unit per cwt. | 0 | 1 | 4 |
| Benzol, 90 % nominal ,, ... ...per gallon | 0 | 2 | 4 |
| ,, 50/90 ,, ... ,, | 0 | 2 | 3 |
| Carbolic Acid (crystallised 35°)... ... per lb. | 0 | 1 | 1½ |
| ,, (crude 60°) ... ...per gallon | 0 | 3 | 8 |
| Creosote (ordinary) ... ,, | 0 | 0 | 1⅜ |
| ,, (filtered for Lucigen light)... ,, | 0 | 0 | 1½ |
| Crude Naphtha, 30 % @ 120° C. ... ,, | 0 | 1 | 0 |
| Grease Oils, 22° Tw. ... per ton | 1 | 17 | 6 |
| Pitch, f.o.b. Liverpool or Garston ... ,, | 0 | 15 | 0 |
| Solvent Naphtha, 90 % at 160° ... ... per gallon | 0 | 1 | 0½ |
| Coke-oven Oils (crude) ... ,, | 0 | 0 | 1½ |
| Copper (Chili bars) ... per ton | 81 | 5 | 0 |
| ,, Sulphate ... ,, | 21 | 0 | 0 |
| ,, Oxide (copper scales) ... ,, | 75 | 0 | 0 |
| Glycerine (crude) ... ,, | 35 | 0 | 0 |
| ,, (distilled S.G. 1250°) ... ,, | 75 | 0 | 0 |
| Iron Peroxide (bog ochre) ... ,, | 1 | 13 | 0 |
| ,, Sulphate (copperas) ... ,, | 1 | 2 | 6 |
| ,, Sulphide (antimony slag) ... ,, | 2 | 0 | 0 |
| Lead (sheet) for cash ... ,, | 13 | 10 | 0 |
| ,, Litharge Flake (ex ship) ... ,, | 14 | 15 | 0 |
| ,, Acetate (white, ,, ) ... ,, | 24 | 10 | 0 |
| ,, ,, (brown, ,, ) ... ,, | 20 | 10 | 0 |
| ,, Carbonate (white lead) pure ... ,, | 18 | 10 | 0 |
| ,, Nitrate ... ,, | 22 | 5 | 0 |
| Lime, Acetate (brown) ... ,, | 7 | 10 | 0 |
| ,, ,, (grey) ... ,, | 12 | 0 | 0 |
| Magnesium (ribbon and wire) ... per oz. | 0 | 2 | 3 |
| ,, Chloride (ex ship) ... per ton | 2 | 0 | 0 |
| ,, Carbonate ... per cwt. | 1 | 17 | 6 |
| ,, Hydrate ... per cwt. | 0 | 10 | 0 |
| ,, Sulphate (Epsom Salts) ... per ton | 2 | 10 | 0 |
| Manganese, Sulphate ... ,, | 17 | 10 | 0 |
| ,, Borate ... per cwt. | 2 | 2 | 6 |
| ,, Ore, 70 % ... per ton | 2 | 12 | 6 |
| Methylated Spirit, 60° o.p. ...per gallon | 0 | 2 | 4 |
| Naphtha (Wood), Solvent ... ,, | 0 | 3 | 9 |
| ,, ,, Miscible, 60° o.p. ... ,, | 0 | 4 | 9½ |
| **Oils:—** | | | |
| Castor ... per cwt. | 1 | 3 | 0 |
| Cotton-seed ... per ton | 21 | 15 | 0 |
| Linseed ... ,, | 19 | 0 | 0 |
| Lubricating, Scotch, 890°—895° ... ,, | 7 | 15 | 0 |
| Petroleum, Russian ... ...per gallon | 0 | 0 | 5⅛ |
| ,, American ... ,, | 0 | 0 | 5⅝ |
| Potassium (metal) ... per oz. | 0 | 3 | 10 |
| ,, Bichromate ... per lb. | 0 | 0 | 4½ |
| ,, Carbonate, 90 % ... per ton | 16 | 15 | 0 |
| ,, Chlorate ... per lb. | 0 | 0 | 5½ |
| ,, Cyanide, 98 % ... ,, | 0 | 1 | 11 |
| ,, Hydrate (Caustic Potash) 80/85 % p. ton | 22 | 0 | 0 |
| ,, ,, (Caustic Potash) 75/80 % ,, | 20 | 5 | 0 |
| ,, ,, (Caustic Potash) 70/75 % ,, | 19 | 7 | 6 |
| ,, Nitrate (refined) ... per cwt. | 1 | 2 | 9 |
| ,, Permanganate ... ,, | 4 | 5 | 0 |
| ,, Prussiate Yellow ... per lb. | 0 | 0 | 6½ |
| ,, Sulphate, 90 % ... per ton | 10 | 10 | 0 |
| ,, Muriate, 80 % ... ,, | 7 | 15 | 0 |
| Silver (metal) ... per oz. | 0 | 3 | 6⅛ |
| ,, Nitrate ... ,, | 0 | 2 | 7½ |
| Sodium (metal)... ... per lb. | 0 | 6 | 0 |
| ,, Carb. (refined Soda-ash) 48 %... per ton | 4 | 12 | 6 |
| ,, ,, (Caustic Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 48 %... ,, | 3 | 15 | 0 |
| ,, ,, (Carb. Soda-ash) 58 %... ,, | 4 | 10 | 0 |
| ,, ,, (Soda Crystals) ... ,, | 2 | 8 | 9 |
| ,, ,, (Crystal Carbonate) ... ,, | 5 | 0 | 0 |
| ,, Acetate (ex ship) ... ,, | 20 | 15 | 0 |
| ,, Chlorate ... per lb. | 0 | 0 | |
| ,, Borate (Borax) ... per ton. | 29 | 0 | |
| ,, Bichromate ... per lb. | 0 | 0 | |
| ,, Hydrate (77 % Caustic Soda)... per ton | 7 | 15 | |
| ,, ,, (74 % Caustic Soda)... ,, | 7 | 2 | |
| ,, ,, (70 % Caustic Soda)... ,, | 6 | 12 | |
| ,, ,, (60 % Caustic Soda, white) ,, | 5 | 12 | |
| ,, ,, (60 % Caustic Soda, cream) ,, | 5 | 11 | |
| ,, Bicarbonate ... ,, | 5 | 0 | |
| ,, Hyposulphite ... ,, | 5 | 7 | |
| ,, Manganate, ... ,, | 6 | 15 | |
| ,, Nitrate (95 %) ex ship Liverpool per cwt. | 0 | 9 | |
| ,, Nitrite, 98% ... per ton | 28 | 0 | |
| ,, Phosphate... ,, | 16 | 10 | |
| ,, Prussiate ... per lb. | 0 | 0 | |
| ,, Silicate (glass) ... per ton | 5 | 10 | |
| ,, ,, (liquid, 100° Tw.) ... ,, | 4 | 0 | |
| ,, Sulphate (Salt-cake)... ... ,, | 0 | 19 | |
| ,, ,, (Glauber's Salts) ... ,, | 1 | 10 | |
| ,, Sulphide ... ,, | 8 | 15 | |
| ,, Sulphite ... ,, | 5 | 2 | |
| Strontium Hydrate, 98 % ... ,, | 6 | 15 | |
| Sugar, Beet ... per cwt. | 0 | 13 | |
| ,, Cane ... ,, | 0 | 16 | |
| Sulphocyanide Ammonium ... per lb. | 0 | 0 | |
| ,, Barium ... ,, | 0 | 0 | |
| ,, Copper, 60% ... ,, | 0 | 0 | |
| Sulphur (Flowers) ... per ton | 8 | 5 | |
| ,, (Roll Brimstone) ... ,, | 5 | 15 | |
| ,, Brimstone: Best 3rds (L'pool). ,, | 4 | 1 | |
| Superphosphate of Lime (28 %) ... ,, | 2 | 5 | |
| Tallow ... ,, | 26 | 0 | |
| Tin (metal) ... ,, | 76 | 0 | |
| ,, Crystals ... per lb. | 0 | 0 | |
| Zinc (Spelter) ... per ton | 15 | 5 | |
| ,, Chloride (solution, 96° Tw.)... ... ,, | 5 | 2 | |

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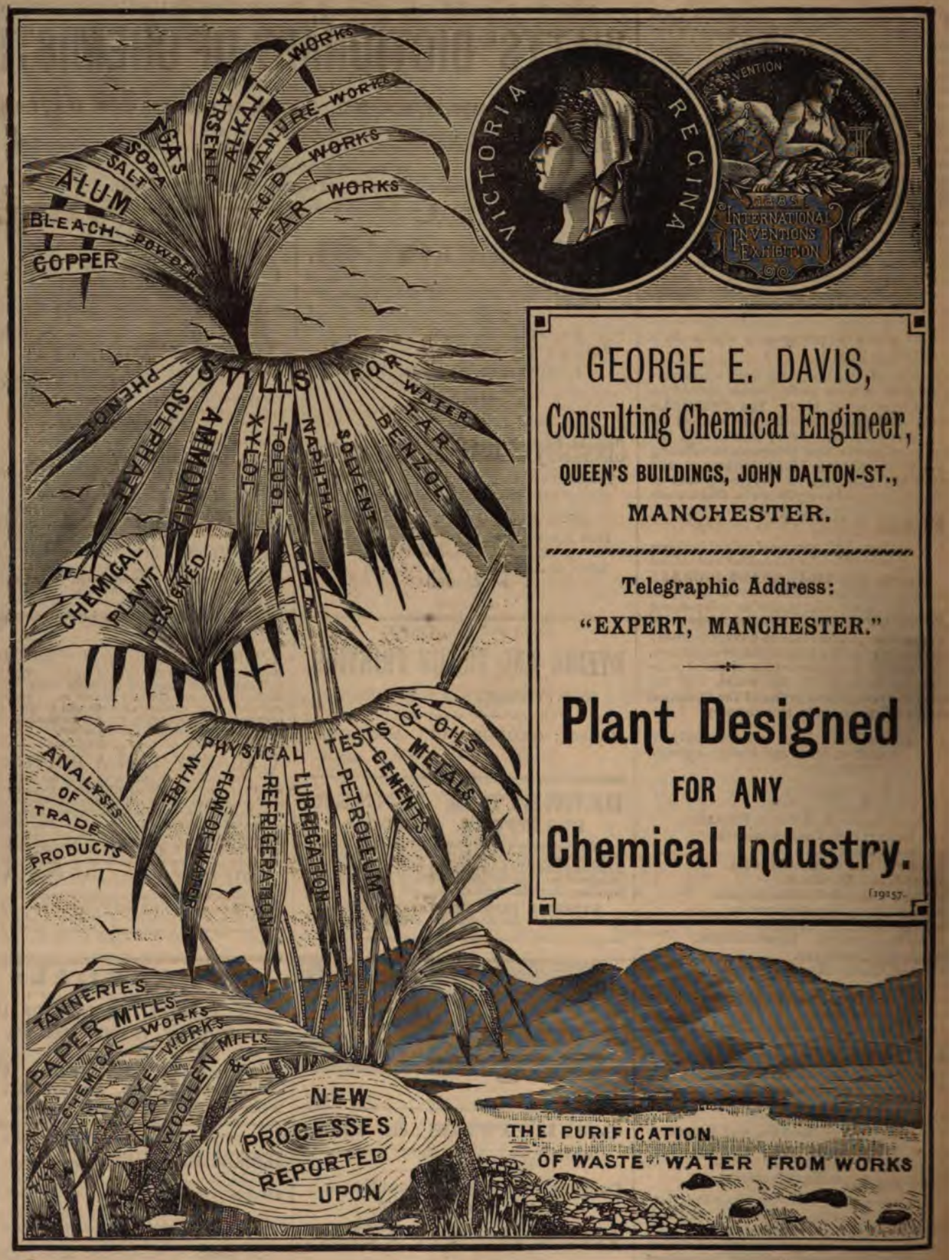


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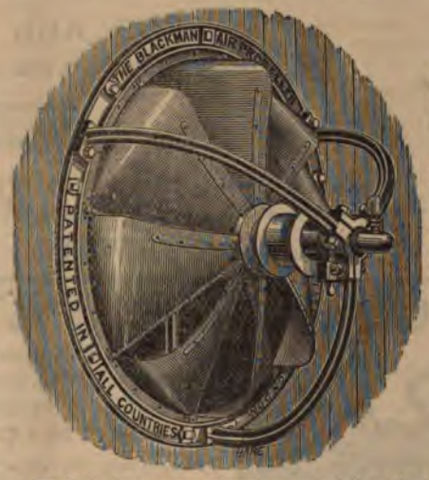


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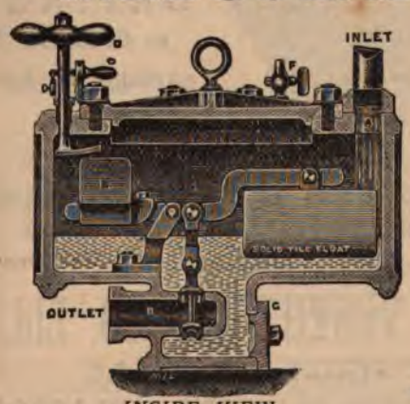


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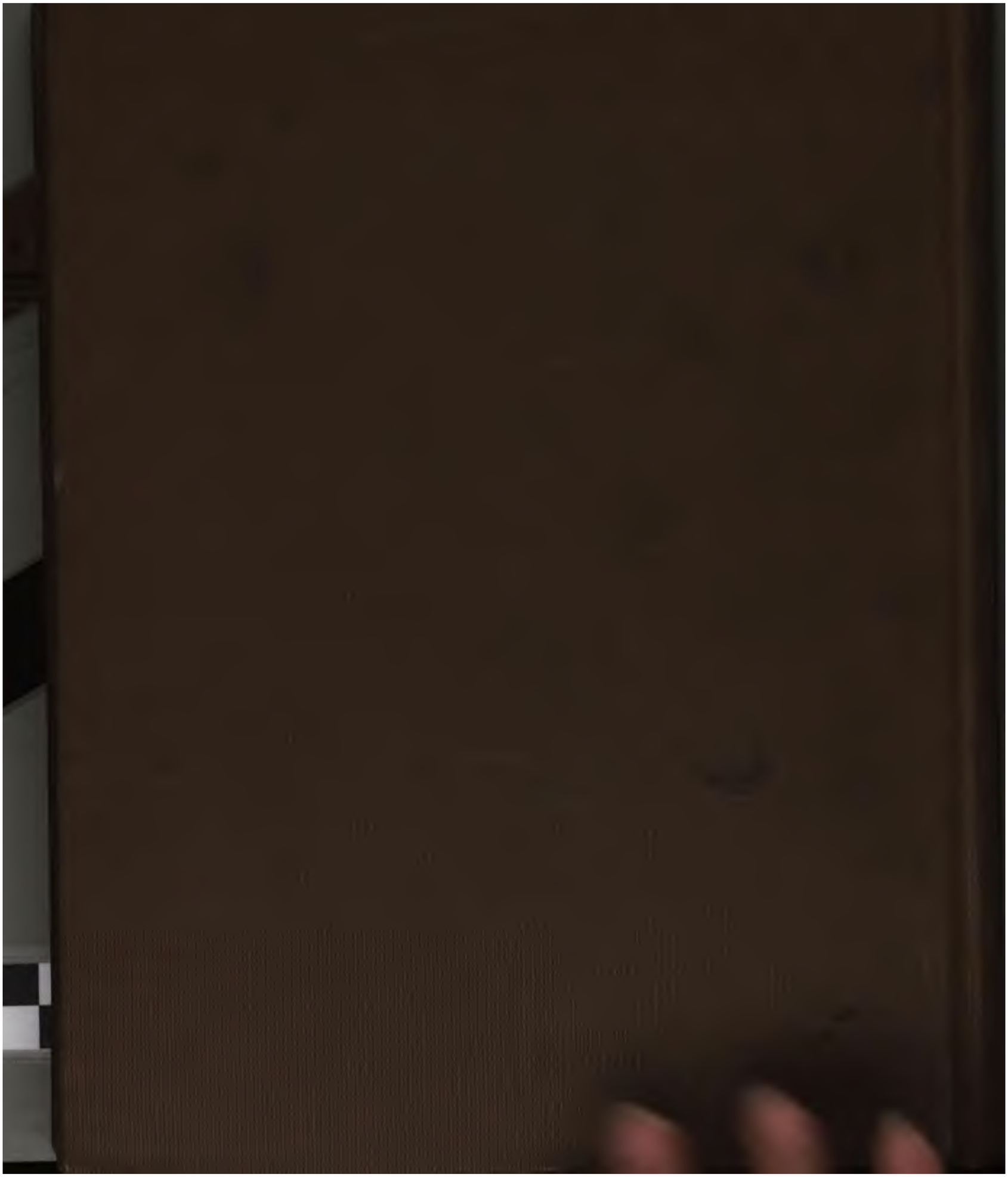
**OUTSIDE VIEW.**